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ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

EDITED BY

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ANNALS OF SURGERY.

AN EXPERIMENTAL CONTRIBUTION TO INTES-
TINAL SURGERY WITH SPECIAL REFER-
ENCE TO THE TREATMENT OF
INTESTINAL OBSTRUCTION.¹

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THE most important, and, at the same time, the most popular topic for discussion among surgeons of the present day is intestinal surgery. The current medical literature is teeming with reports of cases, and at the meetings of almost every medical and surgical society, large or small, this subject comes up for discussion and occupies a liberal space and conspicuous place in their printed transactions. The unusual activity which has been manifested in all parts of the civilized world in the development of this, one of the most modern and aggressive departments of abdominal surgery, is sufficient evidence that the subject is comparatively new, and as yet imperfectly understood. A study of the literature of intestinal surgery must convince every unprejudiced mind that here, as in many other difficult problems in surgery, the positive knowledge which we have acquired rests almost exclusively on the results obtained by experimental research. Gunshot wounds of the abdominal cavity have been made the object of careful and patient experimentation by a number of enthusiastic surgeons, and the results obtained have laid the foundation

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for a rational method of treatment of these injuries, which has been eagerly accepted by all modern aggressive and progressive surgeons. The practical results which have been obtained thus far in the hands of a number of surgeons have been the means of saving a number of lives, which by the old conservative method of treatment would have been doomed to inevitable death from hæmorrhage or septic peritonitis. The numerous valuable practical suggestions for treatment of gunshot injuries of the intestines are the direct outcome of experiments on animals, and this, as well as the remarkable recoveries following gunshot wounds of the abdomen treated by laparotomy, have so firmly convinced the profession of the necessity of resorting to operative measures in such cases that few surgeons could be found at the present day who would be willing to trust to conservative treatment any case where positive, or only probable, evidences pointed towards the existence of a visceral injury of any portion of the intestine. While a decided advance has been made in the treatment of injuries of the intestinal tract, the operative treatment of intestinal obstruction still constitutes one of the darkest and most unsatisfactory chapters in the wide domain of intestinal surgery. The obscurity and uncertainty which cling to this subject are due to the difficulties which often surround an accurate diagnosis. At the same time we have every reason to believe that the appalling mortality which has so far attended the surgical treatment of intestinal obstruction is mainly due to late operations, and not infrequently to a faulty technique in the removal of the cause of the obstruction, and in the restoration of the continuity of the intestinal canal. An accurate anatomical or pathological diagnosis in such cases during life is often difficult, if not impossible, and when, as a *dernier ressort*, laparotomy is performed, and the surgeon is confronted by an unexpected condition of things, he is often in doubt as to what course to pursue, and frequently ends the operation by establishing an artificial anus. No one who has been forced to resort to this measure has left his patient with a feeling of satisfaction, as he must have been sadly impressed with the fact, that, at best, he has only been instrumental in relieving the urgent symptoms of the obstruction, while he has failed to re-

move its cause, and consequently also in restoring the continuity of the intestinal canal. A patient with an artificial anus is indeed an object of commiseration, as experience has sufficiently demonstrated how difficult it is in many instances to close the abnormal outlet, even after the cause of obstruction is subsequently removed or corrected spontaneously, without exposing him a second time to the risks of life incident to another abdominal section. If the causes which have led to the obstruction are of a permanent character, all attempts at closing the fistulous opening will, of course, prove worse than useless, and the patient is condemned to suffer from this loathsome condition the balance of his or her lifetime without a hope of ultimate relief. I believe I can safely make the statement without fear of contradiction that most of these unfortunate patients would prefer death itself to such a life of misery. The ideal of an operation for intestinal obstruction embraces the fulfilment of two principal indications:

1. The removal or rendering harmless of the cause of obstruction.
2. The immediate restoration of the continuity of the intestinal canal.

To meet the first indication the cause of obstruction must be found, its nature determined, and whenever advisable or practicable, it is removed, a step in the operation which may be very easy, or may demand a most formidable and serious undertaking, more especially in cases where the pathological conditions which have given rise to the obstruction are of such a nature as to constitute in themselves an imminent or remote source of danger, as, for instance, malignant disease or gangrene of the bowel from constriction. In all cases of inoperable conditions the cause of obstruction is rendered harmless as far as obstruction is concerned by establishing an anastomosis between the bowel above and below the obstruction by an operation which will be described further on.

Immediate restoration of the continuity of the intestinal canal should be secured in the operative treatment of all cases of intestinal obstruction, with the exception of inoperable cases of carcinoma of the rectum, but is most urgently indicated in cases of obstruction in the upper portion of the small

intestines and the colon, as the formation of an artificial anus in the former locality would prove a direct source of danger from marasmus by excluding too large a surface for intestinal digestion and absorption, while in the latter situation the cure of a fæcal fistula only too often proves an opprobrium of surgery. A careful perusal of the literature on the treatment of intestinal obstruction proves only too plainly the imperfection of this branch of surgery. The rules laid down in our text-books are often given with so much hesitation that it becomes impossible to apply them in practice. Opinions are so widely at variance that every surgeon finally acts upon the impulse of the moment and adopts a method which he deems appropriate for his case. It can be said that no uniformity of action exists, consequently the statistics which have been produced so far are of but little value from a practical standpoint. A rational and successful surgical treatment of intestinal obstruction, like other abdominal operations, can only be established upon a basis founded upon the results obtained by experimental investigation. In view of this fact it is astonishing that so little has been accomplished in this direction. I am convinced that accurate work of this kind will render essential information in the diagnosis of the obscure causes of obstruction, and will point out more clearly the indications for operative interference, while improved methods of operation will have to be studied exclusively in this manner. During the last 18 months I have made 150 operations on animals for the purpose of studying the effects of the principal varieties of intestinal obstruction, which were produced artificially; at the same time I have attempted to establish a number of new operations for the relief of certain forms of intestinal obstruction where it is impossible or inadvisable to remove the local conditions which gave rise to the obstruction. One of the greatest dangers in all operations for intestinal obstruction is the length of time required to perform the ordinary operations: hence it has been my object to simplify the operations, and thus by shortening the time diminish the danger from shock. All patients requiring an operation for intestinal obstruction are invariably in a condition not well adapted for prolonged operations, which necessitate the opening of the peritoneal

cavity and exposure of its contents to the cooling influences of the atmospheric air. An operation which can be completed in twenty minutes must certainly prove less disastrous to the patient than one requiring from one to two hours. A prolonged operation on the intestines is attended by two great risks: (1). Immediate, due to shock. (2). Remote, prolonged exposure to infection. Both of these dangers are diminished in proportion to the shortening of the time consumed in the operation, which is made possible by resorting to simpler measures, provided they are equally safe and efficient.

GENERAL REMARKS ON EXPERIMENTS.

With few exceptions the experiments detailed in this paper were made at the Milwaukee County Hospital, located at Wauwatosa, six miles from Milwaukee. I wish on this occasion to return my thanks to Dr. M. E. Connel, superintendent of the hospital, and his assistants, as well as to Dr. William Mackie, of this city, for valuable services rendered in my experimental work. As the main object of these experiments was not to show favorable statistics, but more for the purpose of studying the effect of different forms of intestinal obstruction and to establish new principles of treatment, the animals were not submitted to any special treatment before or after the operation; the diet was not restricted and no internal medicines were given. I pursued this course in order to bring the intestinal canal in the most unfavorable conditions for operative interference, so as to expose the operations to the severest test. Ether was used exclusively as an anesthetic. The abdomen was shaved, thoroughly washed with soap and warm water, and disinfected with a 1-1000 solution of corrosive sublimate or a two and a half per cent solution of carbolic acid. For the sponges the same solution of carbolic acid or a weaker solution of corrosive sublimate were used. The abdomen was covered by several layers of aseptic gauze, with a slit in the centre. Whenever division or incision of the bowel was made faecal extravasation was guarded against by compressing the bowel on each side by compressors made for this special purpose, or by constriction with an elastic rubber band. Experi-

ence showed that the latter method was preferable, as it proved less injurious to the tissues of the bowel, and afforded greater security against extravasation, while at the same time it proved less disastrous to the circulation between the points of compression. The rubber bands for this purpose should be about an eighth of an inch in width, rendered properly aseptic by prolonged immersion in a five per cent solution of carbolic acid, and can be readily applied by perforating the mesentery with an ordinary hæmostatic forceps at a point not supplied with visible blood vessels, and tied in a loop with sufficient firmness to obstruct the lumen of the bowel. Elastic constriction practiced in this manner prevents all possibility of extravasation, and does not interfere with the free manipulations of the operator, as is the case with clamps or the hands of an assistant, while the degree of compression that is necessary exerts no injurious effects on the vessels and tissues at the seat of constriction. Drainage was never resorted to, and the abdominal wound was always closed by deep interrupted sutures including the peritoneum. In all cases where partial or complete exvagination was made necessary the bowels were kept covered with warm gauze compresses. In all cases where complete exvagination became necessary, and where the bowels remained out of the abdomen for half an hour or more, a certain degree of shock was always noticed, and a number of animals died within a few hours after the operation, death being referable directly to this cause. For an external dressing we used iodoform ointment applied directly over the wound, and a compress of cotton, retained by a bandage, and a jacket, made of coarse cloth. As a rule the sutures were removed at the end of six days, when the wound was usually found healed by primary union.

I—ARTIFICIAL INTESTINAL OBSTRUCTION.

In imitation of the more common forms of intestinal obstruction in the human subject, due to congenital malformation or pathological conditions, the following kinds of obstruction were produced on animals: (1) stenosis, (2) flexion, (3) volvulus, (4) invagination. It is a noteworthy fact that even in

cases where the obstruction was complete from the beginning, vomiting was moderate, and in some instances entirely absent. As vomiting constitutes one of the earliest and most conspicuous and persistent symptoms in most cases of intestinal obstruction in men, we can only explain its lesser intensity or complete absence in animals from the circumstance that animals suffering from this condition, as a rule, refuse all food and drink. As a rule, the tympanitis was also less marked than in the human subject.

1. STENOSIS.

Circular narrowing of the lumen of the bowel was produced by excision of a semi-lunar piece of the intestinal wall and double suturing of the wound in a direction parallel to the intestine; and (2) circular constriction with bands of aseptic gauze.

A.—PARTIAL ENTERECTOMY.

Experiment 1.—Dog, weight 39 pounds. A semi-lunar portion embracing half the circumference of the bowel removed from the convex surface, two inches above the ileo-cæcal valve. Wound closed in a longitudinal direction by Czerny-Lembert suture. The first two weeks the discharges from the bowels were fluid and dark in color, subsequently normal in color and consistence. Animal killed 36 days after operation. Body well nourished; abdominal wound indicated by a firm linear cicatrix. Omentum adherent at point of operation; lumen of bowel at point of operation reduced one-half in size; lumen of bowel above and below the contraction equal in size, showing that the stenosis had not furnished an obstacle to the passage of intestinal contents. A few of the sutures remain attached, their free ends floating in the bowel.

Experiment 2.—Large, full-grown cat. The same operation was performed on the concave side of the bowel about the middle of the ileum, a semi-lunar piece of the wall of the intestine with the corresponding mesentery being removed and the wound closed in a similar manner, which diminished the diameter of the lumen of the bowel to about one-eighth of an inch. It was noticed during the operation that the convex surface of the bowel over an area corresponding to the partial excision presented a cyanosed appearance. The animal died

on the fourth day after operation, and the whole segment of the sutured bowel was found gangrenous, but no fluid in the abdominal cavity.

Experiment 3.—Adult, large cat. In this case a segment of the ileum was emptied of its contents, and before cutting away a semilunar piece from the convex surface, a back-stitch, continuous suture was applied on the inner margin of the proposed line of incision, which left about one-third of the lumen of the bowel. After excision of the semilunar piece the margins of the cut surface were turned inwards and covered with serous surface by a continuous catgut suture. Several small passages occurred after the operation, but the animal died on the fourth day with symptoms of intestinal obstruction. The visceral wound was found healed, but the lumen had become so narrow from the inflammatory swelling of the tunics of the bowel that it was entirely inadequate for the passage of intestinal contents, and as a result of this obstruction the bowel had become considerably dilated above the point of operation.

REMARKS.—These experiments illustrate conclusively that in wounds of the convex side of the intestine, where from the nature of the injury transverse suturing is impossible, longitudinal approximation and suturing can be safely done, provided, at least, one-half of the lumen of the bowel can be preserved. If the stenosis is carried beyond this point there is great danger that the inflammatory swelling following the operation will still further narrow the tube and lead to the most serious consequences due to intestinal obstruction, and place the visceral wound in the most unfavorable condition for the healing process.

Experiment 2 shows the great danger of interference with the blood supply from the mesentery in longitudinal suturing of wounds on the concave side of the bowel, as such a procedure is invariably followed by gangrene of the corresponding segment of bowel on the convex side.

B.—CIRCULAR CONSTRICTION.

The following experiments were made to study the effect of circular constriction upon the circulation of the isolated constricted loop of bowel. In all cases where the constriction

was made with a gauze band this was tied with the same degree of firmness, so as to determine whether the same degree of strangulation would produce identical results.

Experiment 4.—Adult cat. A loop of bowel about the middle of the ileum, six inches in length, was tied with a band of aseptic gauze with sufficient firmness to cause slight congestion, but without interfering with a free arterial supply, as the arteries in the ligated portion continued to pulsate freely. The day after operation a few, small faecal discharges stained with blood. The cat died 48 hours after the operation. No rise in temperature was observed, and death was evidently caused by collapse from perforation. The loop of bowel showed gangrene on convex side equidistant from the point of strangulation, and a small perforation which had given rise to diffuse septic peritonitis. The whole visceral and parietal peritoneum were uniformly affected and the peritoneal cavity contained a considerable quantity of sero-sanguinolent fluid.

Experiment 5.—Large, adult cat. A loop of the ileum of the same length was tied in a similar manner and with same degree of firmness. The animal absolutely refused food until the eighth day. Rise in temperature second and third day. Only one faecal discharge on the second day. Killed eight days after operation. Abdominal wound completely united; no peritonitis. Four inches of bowel below the point of constriction showing that partial reduction had taken place. The gauze band was found completely covered with adherent omentum, and a thick layer of plastic lymph which formed a complete bridge connecting the intestine above and below the ligature. The ligated portion showed no evidence of defective circulation, and no ulceration underneath the ligature. The obstruction was complete as no fluid could be forced through the bowel, and in proof that the same condition existed during life, it was found that the bowel above the constriction was considerably dilated, while below the strangulation it was empty and contracted.

Experiment 6.—Large, Maltese cat. A loop of the ileum, six inches in length, tied in a similar manner. On the third day faeces stained with blood. On the same day the temperature, which had remained nearly normal until this time, rose to 105° F., and on the following day the animal died, having manifested symptoms of perforative peritonitis for 24 hours. Abdominal wound united; recent diffuse peritonitis. The abdominal cavity contained several ounces of sero-purulent fluid. Bowel above constriction distended with fluid contents, below the ob-

struction empty and slightly contracted. The greater portion of strangulated loop was found gangrenous and adherent to adjacent loops of bowel. Perforation had taken place in the middle of the loop on the convex surface, showing that gangrene had taken place first at this point and had extended from here towards the ligature.

Experiment 7.—Adult dog, weight 26 pounds. In this case an opening was made in the mesentery through which a loop of the small intestine, six inches in length, was pushed. With sutures this opening was made sufficiently small so that its margins produced slight strangulation. The dog remained perfectly well after the operation, and was killed on the twenty-second day. Abdominal wound completely healed. No signs of peritonitis. On searching for the seat of obstruction it was found that spontaneous reduction had taken place, the site of perforation in the mesentery being indicated by a recent cicatrix.

REMARKS.—The post-mortem appearances in these cases demonstrate clearly that the gangrene was not produced by the primary mechanical strangulation, but that it depended upon consecutive pathological changes in the loop or its vessels. In experiment No. 5. the primary strangulation was fully as great as in the preceding experiment, and yet gangrene did not take place, and we have positive proof that vascular engorgement in the ligated portion was less intense from the fact that partial reduction took place. In all cases where gangrene resulted, it must not have been from deficient arterial blood supply, but from an obstruction to the return of blood through the veins. If defective arterial blood supply had been the immediate cause of the gangrene, we would have found more constantly gangrene of the entire loop, while every specimen illustrated that gangrene always commenced at a point where the return of venous blood met with the greatest resistance, viz., on the convex surface in the middle portion of the loop. As in cases of hernia, or in any other form of intestinal strangulation, where a firm constricting band surrounds the loop of bowel, the danger of complete strangulation is increased if by the peristaltic action additional portions of the intestine are forced through the ring, and the immediate cause of the gangrene is always referable to obstruction to the return of venous blood which leads rapidly to œdema, complete stasis,

and moist gangrene in that portion where the venous circulation is most seriously impaired. Violent peristalsis under such circumstances always aggravates the existing conditions, and is often the precursor of symptoms of complete strangulation. In such cases opiates act favorably by arresting peristaltic action, and in so doing may avert gangrene by preventing the causes which otherwise would have led to complete venous stasis.

2. FLEXION.

As many instances are on record where flexion of the bowel constituted the cause of intestinal obstruction, this condition was artificially produced in animals either by making a partial enterectomy by removing a wedge-shaped piece from one side of the bowel, or, by bending the bowel upon itself acutely and fixing it in this position with catgut sutures.

Experiment 8.—Dog, weight 60 pounds. A wedge-shaped piece of the wall of the ileum was removed from the concave side with a corresponding portion of the mesenteric attachment, and after arresting the bleeding by tying several vessels with catgut, the wound was closed transversely by two rows of sutures. The excised piece measured one inch at its base, and the apex reached as far as the median line of the bowel. Immediately after excision, the convex portion of the bowel which had become acutely flexed by uniting the wound presented a livid, congested appearance, and after tying of the sutures the cyanosis increased. The area of disturbance of the circulation corresponded to the width of the base of the excised portion. About 14 inches from this place a similar piece was excised from the convex side of the bowel, and the wound closed in the same manner. At this point the flexion was only slight, the mesenteric portion forming the prominence of the curve. On the third day the temperature rose to 105.6° F., and the following day the animal died with symptoms indicative of perforative peritonitis. On opening the abdomen diffuse, general peritonitis was found with numerous adhesions. Gangrene and perforation were found on the convex side directly opposite the first operation. Second visceral wound closed and lumen of bowel at this point somewhat contracted, but permeable to fluids.

Experiment 9.—Large, adult cat. Removed from convex side of ileum a triangular piece measuring one inch at its base and the apex

reaching a little beyond the middle line of the bowel. Wound closed transversely by Czerny-Lembert sutures. After closure of the wound the bowel presented at point of partial resection an obtuse angle, the apex being formed by the mesenteric portion. The stools were bloody the second day after operation. The animal remained in excellent condition until it was killed, 43 days after operation. Adhesions of loops of small intestines to abdominal wound and of omentum and adjacent intestines at point of operation. The extent of flexion was found somewhat diminished, yet the concavity on convex side of bowel was well marked. Size of bowel above and below the operation was equal, showing that the flexion had not acted as a cause of obstruction. On opening the bowel a pouch-like bulging was found on the mesenteric side, which appeared to compensate for the narrowing caused by the artificial stenosis. Two of the deep sutures still remained attached to the inner surface of the bowel.

Experiment 10—Adult, large cat. In this case a loop of the middle portion of the ileum, four inches in length, was acutely flexed in such a manner that the peritoneal surfaces of the convex side were brought in contact, and in this position the bowel was fixed by a number of fine catgut sutures. No symptoms pointing towards intestinal obstruction were observed, and the animal was killed 16 days after the operation. Wound was found completely united, and no signs of peritonitis. The angle of flexion had somewhat diminished, but otherwise the bowel adherent in position left after operation. The bowel presented no dilatation above nor contraction below the flexion, showing that complete permeability of the canal at the point of flexion was quickly restored.

REMARKS.—The partial excision on concave side of bowel in experiment No. 8 illustrates the danger of suturing wounds in this locality where the blood supply from the mesentery is likewise impaired, as gangrene of the remaining portion of the bowel is almost certain to take place. In all wounds on this side of the bowel more than half an inch in length, there is also another great danger which attends transverse suturing, viz., stenosis, which may become the cause of intestinal obstruction. As the small intestines naturally describe quite a strong curve with the concavity on the mesenteric side, closure of a wound involving this portion of the bowel gives rise to acute flexion which, at least, during the process of healing, must cause more or less obstruction until by yielding of the

opposite portion of the intestinal wall an adequate dilatation of the calibre of the tube has taken place. A considerable portion of the wall on the convex side of the bowel can be removed and sutured transversely until the bowel has been transformed into a straight tube, and a wound an inch in length will make only a slight flexion which furnishes no serious mechanical obstacle to the passage of the intestinal contents. In this connection the question arises: Does simple flexion, even if acute, without diminution of the lumen of the bowel, give rise to symptoms of obstruction? I have made numerous flexions when performing operations for establishing intestinal anastomosis, and in most instances satisfied myself by examination of the specimens that fluids passed them without great difficulty. If the bowel at the point of flexion remains free, certain portions of its wall will yield to pressure of the fluid intestinal contents, and gradually the lumen of the bowel will become restored. If, on the other hand, the entire circumference of the bowel at the point of flexion has become fixed and immovable by inflammatory adhesions or other pathological products, a compensating dilatation becomes impossible and the flexion becomes a direct and serious cause of obstruction.

3, VOLVULUS.

This condition, only another form of flexion, was experimentally produced by rotating a loop of intestine one and a half or two times around its axis and retaining it in this position by a number of fine sutures which were applied in places at the base of the volvulus, where fixation was most required.

Experiment 11.—Dog, weight 12 pounds. A loop of the ileum, eight inches in length, was brought out through a small incision and the tubes turned around their axis twice and the twist maintained by two catgut sutures. The constriction was sufficiently firm to cause considerable venous engorgement in the twisted loop. The dog manifested no unpleasant symptoms after the operation. The specimen was not obtained, as after a few days the dog ran away.

Experiment 12.—Medium-sized adult cat. In this case the volvu-

lus was made by twisting a loop of the ileum, about four inches in length, twice around its axis, and retaining it in this position by a number of fine silk sutures. Vomited several times during the first day. The first three days in taking the temperature in the rectum the thermometer when taken out was bloody. The first two days the temperature was normal, followed by an increase to 104.6° F. and 103.2° F. the two succeeding days, then it became normal. No constipation; appetite good throughout the whole time. Animal killed 22 days after operation. Abdominal wound completely united; no peritonitis. Volvulus remains as after operation, with the exception that where the bowel had been flattened by the twisting it had, at least, partially resumed its tubular form. Serous surfaces where approximated had become firmly adherent at point of constriction, size of bowel considerably diminished. The twisted loop contained liquid fæces. Connecting the specimen with the faucet of a hydrant, water could be forced through, but on increasing the force of the current the peritoneum ruptured extensively in a longitudinal direction to point of partial obstruction.

REMARKS.—These experiments are interesting, inasmuch as the primary constriction produced in making and maintaining the volvulus which was sufficient to cause venous engorgement in the twisted loop must have been only of short duration, the disappearance of the effects of constriction being undoubtedly due to the gradual yielding of the sutured parts, while the faulty axis of the twisted loop was maintained by the sutures the circulation improved and remained in a sufficiently vigorous condition to adequately nourish the most distant portions of the volvulus. While it was found difficult to force fluid through the specimen of a volvulus, during life, propulsion of the intestinal contents by peristaltic action was carried on in a satisfactory manner, as the bowel above the volvulus was not dilated, and contained no abnormal amount of fluid, and the animal manifested no symptoms indicative of intestinal obstruction.

4.—INVAGINATION.

The most frequent, and, from a surgical standpoint, the most important form of intestinal obstruction is invagination.

Leichtenstern and Leubuscher have made careful experimental studies to explain the mechanism and pathological conditions which give rise to this kind of intestinal obstruction, but in the following experiments this part of the subject was ignored, and the invaginations were made by direct manipulation. It was found impossible to make an invagination at any point, as long as the bowel was in a condition of contraction, consequently it was always found necessary to wait until the peristaltic wave had passed by, or to cause relaxation by firm pressure continued for several minutes. Usually, it was found easy to produce an invagination of the bowel, when in a state of relaxation, by indenting one side of the bowel, and pushing the pouch forward with a blunt instrument until the entire lumen of the intestine had passed into the section of the bowel below. After this was accomplished, further invagination was readily effected by manipulation consisting in pushing gently the intussusceptum and intussusciens in opposite directions. After I had learned by experience that disinvagination frequently takes place spontaneously, I resorted sometimes to suturing of the intussusceptum to the neck of the intussusciens for the purpose of maintaining the invagination. But even this expedient did not always succeed in retaining the malposition, as spontaneous reduction was observed in several of these cases.

Experiment 13.—Adult cat. The lower portion of the ileum and the cæcum and upper portion of the colon were drawn forward into an incision through the linea alba, and 5 inches of the ileum were pushed into the colon through the ileo-cæcal valve, when the parts were replaced and the abdominal wound closed. For six days the animal had a temperature from 102.6° to 105° F. and suffered from tenesmus. The stools contained mucus and blood. After the sixth day the symptoms due to invagination subsided, and were replaced by symptoms of peritonitis. The animal was killed 22 days after operation. Great emaciation; abdominal wound completely united; diffuse purulent peritonitis. The disease had evidently commenced in the ileo-cæcal region, as at this point the pathological changes were found most advanced. Complete spontaneous reduction of the invagination; colon greatly distended, and intensely congested.

Experiment 14.—Large, adult cat. Invagination was made in the lower part of the ileum. Length of intussusceptum three inches. For nine days the scanty faecal discharges contained mucus and at times blood. On the ninth day the temperature registered 105° F.; absolute refusal of food, and only occasional vomiting; death on the thirty-third day after invagination. Abdominal wound healed; small ventral hernia; no peritonitis. Apparently, the greater portion of the intussusceptum had disappeared by sloughing, and the subsequent healing process had produced an acute flexion at the neck of the intussusciens. Firm adhesions between peritoneal surfaces in the concavity of the flexion, nearly an inch in length. Above this point the intestine enormously dilated and distended with fluid contents. Below the obstruction the bowel was found contracted and empty. Water could not be forced through the obstruction from either direction. On slitting open the bowel in a longitudinal direction it was found that the lumen at the point of flexion was contracted to such an extent that only a fine probe could be passed. On the concave side of the flexion the mucous membrane presented a prominence marked by a number of longitudinal ridges. These folds had undoubtedly acted like valves in completely preventing the passage of intestinal contents, and later of the injection of water. Death in this case resulted from intestinal obstruction caused by cicatricial contraction after the sloughing of the invaginated portion of the bowel.

Experiment 15.—Adult cat. Two inches of the ileum were invaginated into the colon and fixed by two fine silk sutures at the neck of the intussusciens. For two days after the invagination the stools were scanty and contained mucus and blood. On the third day the abdominal cavity was re-opened by an incision along the outer border of the right rectus muscle, and the invaginated bowel drawn forward into the wound. No peritonitis. The bowel at point of operation was very vascular, and the neck of the intussusciens covered with plastic exudation. The sutures were removed and the rectum and colon distended with water for the purpose of effecting reduction. As soon as the colon had become thoroughly distended the adhesions gave away with an audible noise, and complete reduction followed in such a manner that the portion last invaginated was first reduced. After reduction had been accomplished the injection was continued to test the competency of the ileo-cæcal valve. As soon as the cæcum was well distended the fluid passed readily through the valve into the small intestines, showing that the valve had been rendered incompetent by the invagination. The force required to overcome the adhesions in

the reduction of the invagination was sufficient to rupture the peritoneal covering of the large intestines in three different places, the rents always taking place parallel to the bowel. The animal died on the following day with symptoms of diffuse peritonitis.

Experiment 16.—Ascending invagination in a cat. A few inches above the ileo-cæcal region the ileum was invaginated in an upward direction to the extent of two inches. At the time the invagination was made the intussusciptions contracted firmly. In consequence of this a tear occurred in its peritoneal covering in a direction parallel to the bowel. The stools were few and scanty. On the fourth day the animal died of perforative peritonitis. Abdominal wound not united, but the peritoneal wound closed by omental adhesions. Spontaneous reduction of half an inch of the invagination had taken place. Reduction by traction was found impossible on account of firm adhesions about the neck of the invagination. Recent diffuse peritonitis caused by two perforations, one at the neck of the intussusceptum on mesenteric side, and the other a little to one side of this one and on proximal side of bowel. The perforation resulted from beginning sloughing of the invaginated portion of the bowel. About two inches above the invagination the bowel was acutely flexed towards the mesenteric side by recent firm adhesions. Flexion was undoubtedly caused by circumscribed plastic peritonitis and increased peristalsis.

Experiment 17.—Large, adult cat. Descending invagination of ileum to the extent of two inches in the upper portion of this part of the bowel. Second and third days the scanty discharges from the bowel bloody. Temperature from the second day after operation varied between 103.4° F. and 105.4° F. Death from perforative peritonitis on the seventh day after invagination. Abdominal wound united. Recent diffuse peritonitis from a perforation at the neck of the invagination on the mesenteric side. Gangrene of intussusceptum and partial separation which has again caused a sharp flexion of the bowel at the neck of the invagination. Above the seat of obstruction the bowel dilated and distended with fluid contents, below empty and contracted.

Experiment 18.—Young cat. Invagination of ileum into ascending colon to the extent of three inches. For a week after operation frequent tenesmus followed by mucous discharges mixed with blood. The temperature during this time varied from 102.6° to 105° F. After this the animal improved and was in good condition when killed fourteen days after operation. Abdominal wound united. No omental adhesions or peritonitis. Firm union between the serous surfaces.

No dilatation of bowel above seat of obstruction. Intussusceptum not gangrenous, its lumen about the size of an ordinary lead-pencil. It was found impossible to reduce the invagination by traction or by forcible injection of fluid from below. When the traction was increased the peritoneal surface of the neck of the intussusciens ruptured in a longitudinal direction.

Experiment 19.—Large, adult cat. Six inches of the ileum were invaginated into the colon. Frequent bloody discharges until the third day when the abdomen was reopened and the neck of the intussusciens exposed to sight so as to observe directly the mechanism of disinvagination by rectal injection of water. As soon as the colon was well distended the adhesions at the neck of the intussusciens began to give way, and complete reduction followed, as the adhesions gave away under the pressure from below. The abdominal wound was again closed and dressed in the usual manner. The animal recovered completely from the operation, and was killed twenty-four days after the first operation. Abdominal wound well united. In the ileo cæcal region numerous adhesions around the portion of bowel which had been invaginated and subsequently reduced.

Experiment 20.—Invagination of colon into colon was commenced about the middle of the bowel and advanced as far as the cæcum. Second day bloody discharges from the bowels. Animal killed five days after operation. External wound united only on peritoneal side. Invagination completely reduced. Localized plastic peritonitis limited to the portion of the bowel which had been invaginated, otherwise peritoneum and intestines in a healthy condition.

Experiment 21.—Invagination of colon into colon to the extent of four inches in a cat. The subsequent symptoms only for a short time indicated the existence of invagination, which after they had subsided were followed by evidence of peritonitis. Death occurred on the nineteenth day after the invagination. Abdominal wound well united; diffuse purulent peritonitis; under surface of diaphragm covered with plastic lymph. Although sought for, no perforation could be found in the disinvaginated bowel, but as the peritonitis appeared to have started at the site of operation, it is probable that infection took place through the parietic walls of the disinvaginated bowel.

Experiment 22.—Same kind of invagination made in a cat as in the preceding case. For two days the stools were frequent, scanty, and contained mucus and blood. After this the animal remained in good condition until it was killed thirty-five days after the invagination. Abdominal cavity showed no trace of inflammation. The invagination

was completely reduced and the entire colon presented a normal appearance.

REMARKS.—With the exception of experiment No. 16, the invagination was always made in a downward direction. In the case of ascending invagination gangrene of the intussusceptum and perforation resulted in death from diffuse peritonitis on the fourth day after partial spontaneous reduction had taken place. In experiments, Nos. 15 and 19, both cases of ileo-cæcal invagination, complete reduction was effected by distention of the colon with water; in the first case the force required to accomplish this result was sufficient to produce multiple longitudinal lacerations of the peritoneal surface of the distended bowel, which undoubtedly were responsible for the death on the following day from diffuse peritonitis; while in the second case no such accident occurred, and the animal recovered, although the abdominal wound was re-opened for the purpose of observing the mechanism of reduction by this method of procedure. In one case of ileo-cæcal invagination, experiment No. 18, the intussusceptum remained *in situ* after the invagination, and became so firmly adherent with the intussusciens that even in the specimen reduction by traction was found impossible. In this case, although the lumen of the invaginated portion barely permitted the introduction of an ordinary lead pencil, no symptoms of obstruction were manifested during life, and the bowel above the invagination was not found dilated after death. In experiment No. 14, the sloughing of the intussusceptum led to cicatricial contraction of the bowel and flexion at site of invagination, conditions which resulted in death from obstruction twenty-three days after invagination. The great danger which attends sloughing of the invaginated portion is circumscribed gangrene and perforation of the intussusciens at the neck, and death from perforative peritonitis, as illustrated by experiments Nos. 16 and 17. Experiment No. 16 illustrates that ascending invagination, should it occur, is not more likely to be reduced spontaneously than the more common form of descending invagination. These experiments also demonstrate conclusively that the danger attending the invagination increases the higher it is located in

the intestinal canal, being greatest when it is situated high up in the tract of the small intestines, and gradually less as the ileo-cæcal region is approached. The ileo-cæcal form is less dangerous as spontaneous reduction is more likely to take place, and gangrene of the intussusceptum, when it occurs, does so after a longer time after firm adhesions about the neck of the intussusciptions have formed, a condition which is well adapted to prevent perforation. Of the three invaginations of the colon, experiments, Nos. 20, 21 and 22, complete spontaneous reduction took place in all of them from the first to the fourth day, and in only one of them was the result fatal, in experiment No. 21, where purulent peritonitis, either from infection through the operation wound or, what is more probable, through the damaged wall of the colon occurred, and was the cause of death on the nineteenth day after the invagination. Experiments Nos. 15 and 19, prove both the danger and the utility of distention of the colon in cases of ileo-cæcal and colonic invaginations. As a rule, the longer the invagination has existed the firmer the adhesions, and consequently the greater the danger of relying too persistently on this measure in reducing the invagination. In resorting to this expedient in the reduction of an ileo-cæcal invagination, it is of the greatest importance to relax the abdominal wall completely by placing the patient fully under the influence of an anæsthetic, and to add to the distending force as much as possible by gravitation, the patient should be inverted and the injection should always be made very slowly and with requisite care to prevent rupture of the peritoneal coat by rapid over-distention. When the obstruction is located beyond the ileo-cæcal valve, no reliance can be placed upon this measure, as can be seen from the following experiments made to determine the

PERMEABILITY OF THE ILEO-CAECAL VALVE.

Experiment 23.—While completely under the influence of ether an incision was made through the linea alba of a cat, sufficiently long to render the ileo-cæcal region readily accessible to sight. An incision was made into the ileum just above the valve, and by gently retracting the margins of the wound, the valve could be distinctly seen; water was then injected per rectum, and as the cæcum became well dis-

tended it could be readily seen that the valve became tense and appeared like a circular curtain preventing effectually the escape of even a drop of fluid into the ileum. The competency of the valve was only overcome by *over-distention* of the cæcum which mechanically separated its margins, which allowed a fine stream of water to escape into the ileum. The insufficiency of the valve was clearly caused by great distention of the cæcum. That such a degree of distention is attended by no inconsiderable danger was proved by this experiment, as the cat was immediately killed, and on examination of the colon and rectum a number of longitudinal rents of the peritoneal coat were found.

Experiment 24.—In this experiment, a cat was fully narcotized with ether and while the body was inverted water was injected per rectum in sufficient quantity, and adequate force by means of an elastic syringe, to ascertain the force required to overcome the resistance offered by the ileo-cæcal valve. Great distention of the cæcum could be clearly mapped out by percussion and palpation before any fluid passed into the ileum. As soon as the competency of the valve was overcome, the water rushed through the small intestines, and having traversed the entire alimentary canal issued from the mouth. About a quart of water was forced through in this manner. The animal was killed and the gastro-intestinal canal carefully examined for injuries. Two longitudinal lacerations of the peritoneal surface of the rectum, over an inch in length, were found on opposite sides of the bowel.

Experiment 25.—This experiment was conducted in the same way as the foregoing, only that the cat was not etherized. More than a quart of water was forced through the entire alimentary canal from anus to mouth. The animal was not killed, and lived for eight days, but suffered the whole time with symptoms of ileo-colitis. A post-mortem examination was not made in this case, although the symptoms manifested during life leave no doubt that they resulted from injuries inflicted by the injection. It will thus be seen that in the three cases where fluid was forced beyond the ileo-cæcal valve, in two of them the post-mortem examination revealed multiple lacerations of the peritoneal coat of the large intestines, while the third animal sickened immediately after the experiment was made, and died from the effects of the injuries inflicted eight days later. The injection of water beyond the ileo-cæcal valve in the treatment of intestinal obstruction must therefore be looked upon in the light of a dangerous expedient and should never be resorted to.

[TO BE CONTINUED.]

THE RELATIONS OF THE PERITONEUM TO THE
ABDOMINAL WALL, RECTUM AND BLADDER,
WITH ESPECIAL REFERENCE TO SU-
PRAPUBIC CYSTOTOMY, AS SHOWN
BY FROZEN SECTIONS OF THE
MALE PELVIS.¹

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I N performing supra-pubic cystotomy, to cut into the bladder without endangering the peritoneum or doing undue violence to the connective tissue back of the pubes is the important part of the operation. Shall this be done with the bladder empty or partially filled, either alone or in connection with a distended rectum, are questions upon which all are not yet fully agreed.

For the purpose of investigating these mooted points I have undertaken, with the assistance of medical student, John S. Perekhan, a series of experiments upon a number of cadavers.

The results are shown in these drawings which are made from photographs of frozen sections of the adult male. They represent the parts as enlarged to three times their natural size.

Plate I. represents a section of a subject 40 years of age, weighing 100 pounds. It shows the normal relation of the parts, the bladder and rectum being empty. Here we see the anterior peritoneal reflection is one and one-half inches below the crest of the symphysis pubis.

¹Read in the Section on Anatomy of the Ninth International Medical Congress, Washington, D. C.

Plate II. represents a section of a subject 40 years of age, weighing 140 pounds. It shows the bladder as empty and the rectum distended with fifteen fluid ounces of plaster of paris solution. Here we see the anterior peritoneal reflection is one inch below the crest of the symphysis pubis.

PLATE I.—Peritoneal Reflection.

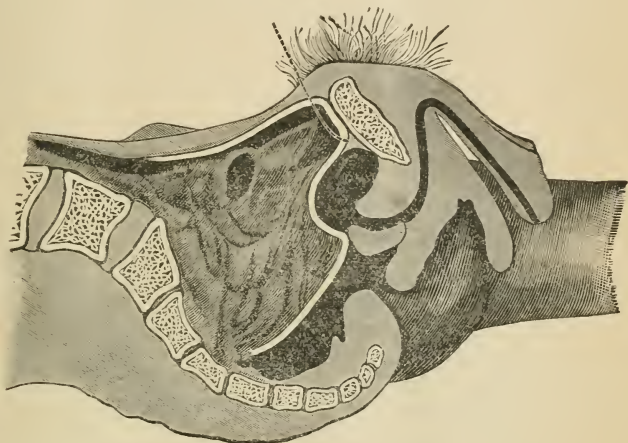


Plate III. represents a section of a subject, 35 years of age, weighing 110 pounds. It shows the rectum as empty and the bladder distended with ten fluid ounces of plaster of paris solution. Here we see the anterior peritoneal reflection is one-fourth inch below the symphysis pubis.

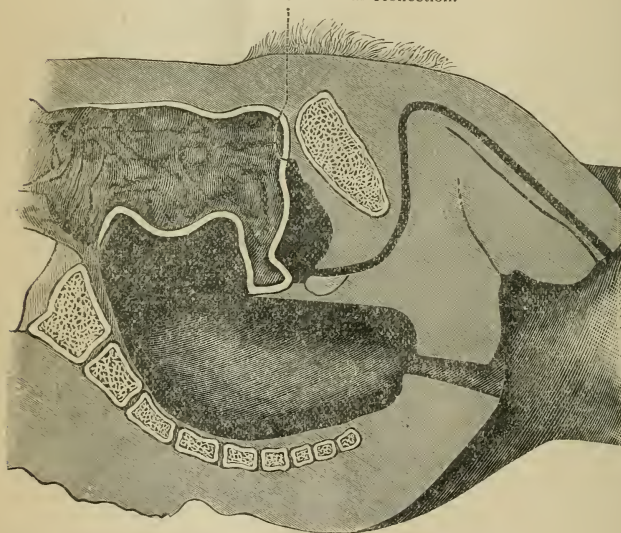
Plate IV. represents a section of a subject, 40 years of age, weighing 140 pounds. It shows the rectum as containing fifteen and the bladder ten fluid ounces of plaster of paris solution. Here we see the anterior peritoneal reflection is seven-eighths of an inch above the symphysis pubis.

You observe this white line running across the bladder in plate III. and IV.; this indicates the height to which the plaster of paris solution of ten ounces came. The space above

contained air which, I think, must have been there before the bladders were injected.

Looking at the plates with reference to the relation the anterior peritoneal reflection bears to the crest of the symphysis pubis, we observe in the normal condition of the parts, when the bladder and rectum are empty, it is one and one-half inches below ; when the bladder is empty and the rectum distended with fifteen ounces, it is one inch below ; when the rectum is

PLATE II.—Peritoneal Reflection.



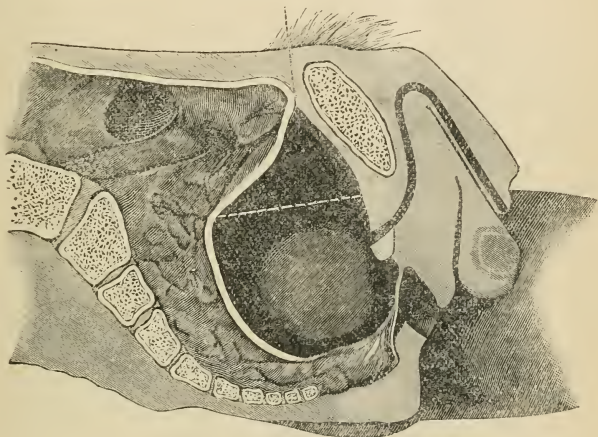
empty and the bladder distended with ten ounces, it is one-fourth of an inch below ; when the rectum is distended with fifteen, and the bladder with ten ounces, it is seven-eighths of an inch above.

Numerous experiments made upon many other subjects treated without freezing, as is seen in each of these drawings, give the same general results.

After preparing each cadaver two lines of investigation were followed. In the first a small opening was made into the abdominal cavity, and the parts examined by touch and sight. In the second, supra-pubic cystotomy was made, and the parts explored by abdominal section afterwards.

To give in detail one case under the first head will be sufficient to show in what manner our investigations were conducted.

PLATE III.—Peritoneal Reflection.



Case IV., male, 50 years of age, weighing 150 pounds, dead 24 hours; bladder empty, rectum washed out, rubber bag placed in the bowel and gradually distended with twelve fluid ounces of water.

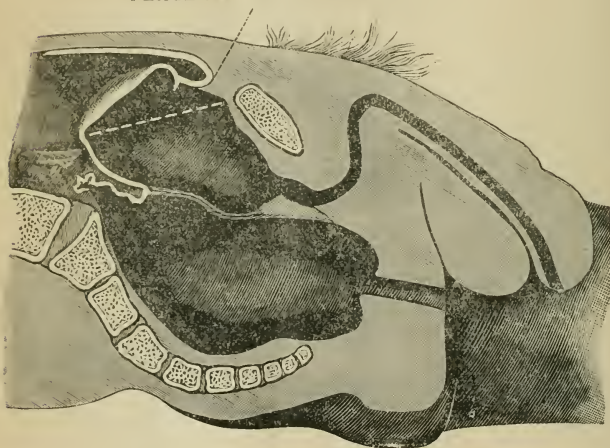
A cut was made into the abdominal cavity in the median line below the navel, just large enough to admit the index finger; the anterior peritoneal reflection was found to be at the crest of the symphysis pubis. The rectum was only moderately distended, filling up the floor and the posterior wall of the pelvis to within one inch of the promontory of the sacrum.

Next 12 ounces of water were injected into the bladder, which caused it to rise upward, nearly to the base of the sacrum, and forward against the abdominal wall, dragging the peritoneum with it to a height of three-fourths of an inch above the crest of the symphysis pubis.

Next the water was let out of the bladder which immediately settled down till the peritoneum was even with the crest.

Then the water in the rectal bag was increased from 12 to 15,

PLATE IV.—Peritoneal Reflection.



then to 24 fluid ounces; in neither case was the anterior peritoneal reflection elevated. All the fluid was contained in the rectum proper; it did not ascend to a higher point than one inch below the promontory of the sacrum. Next the abdominal opening was enlarged, and on inspection of the parts the rectum was seen to be very much distended, but there was no rupture of its fibres.

The following table gives a brief summary of this series of cases.

TABLE NO. I.

Subject.	Sex.	Weight.	No of Fluid Ounces in Rectal Bag.	No of Fluid Ounces in Bladder.	Relation of Anterior Perito- neal Reflection to the Crest of Symphysis Pubis, in Inches and Fraction There- of.	Relation of Upper Dilated End of the Rectum to the Promontory of the Sacrum by Inch Measurement.
1	F	112	12	10	$\frac{1}{4}$ below	
1			22	10	even	2 below
1			22	22	$\frac{1}{4}$ above	2 below
2	M	160	12	10	even	
2			12	14	2 above	
2			0	air	3 above	
3	M	220	15	10	4 above	
3			15	16	6 above	even
3			18	16	6 above	2 above
4	M	150	12	0	even	1 below
4			12	12	$\frac{3}{4}$ above	1 below
4			18	0	even	1 below
4			24	0	even	1 below
5	M	150	6	0	$\frac{1}{2}$ below	
5			12	0	$\frac{1}{2}$ below	even
5			18	0	$\frac{1}{2}$ below	2 above
6	M	150	0	12	$\frac{1}{4}$ below	
6			6	12	even	
6			12	12	even	1 below
6			16	12	$\frac{1}{4}$ above	even
6			16	15	$\frac{1}{2}$ above	
6			16	21	2 above	
6			0	air	$2\frac{1}{4}$ above	
6			10	10		1 above
6			10	6	$\frac{3}{4}$ above	
6			10	10	$1\frac{3}{4}$ above	
7	F	190	0	air	$1\frac{1}{4}$ above	
8	F	130	12	12	$1\frac{1}{4}$ above	$\frac{1}{2}$ below
8			0	air	$2\frac{1}{4}$ above	
8			0	12	$1\frac{1}{2}$ above	
8			0	18		
21	M	125	12	0		even
21			15	0		2 above
21			15	12	$2\frac{1}{2}$ above	
21			23	0		3 above, burst rectum.

In the second series of cases supra-pubic cystotomy was first made and the parts inspected afterward.

The following case is offered in illustration: Subject XIII, male, of good muscular development, 40 years of age, weighing 160 pounds, bladder empty; the rectum was washed out, and 12 fluid ounces of water were injected into the rectal bag, and 10 ounces into the bladder. Supra-pubic cystotomy was made without seeing or injuring the peritoneum, also without disturbing the space between the bladder and pubes.

The manner of operating was as follows: An incision was carried from the crest of the pubes upward in the median line three inches, linea alba exposed, then a cut between the pyramidalis muscles exposed the transversalis fascia; a small nick was made into this, opposite to the crest of the pubes, and then enlarged upward an inch; the end of the index finger was put into the wound and the underlying fatty tissue hooked up; a little scraping below the fingers revealed the bluish appearing bladder, the apex of which could be felt $2\frac{1}{2}$ inches above the crest; the bladder, only moderately distended, was easily picked up with common dissecting forceps, and an incision an inch in length made into the anterior surface, about one ounce of fluid escaping; left index finger, hooked into the bladder, felt its apex one inch above the upper end of the cut into it.

The following table is a brief summary of the cases operated upon without seeing or injuring the peritoneum:

TABLE NO. 2.

Subject.	Sex.	Age.	Height.	Fluid Ounces in Rectal Bag.	Fluid Ounces in Bladder.	Relation of the Apex of the Bladder to the Crest of the Pubes, in Inches and Fractions Thereof.
9	M	45	160	0	10	$\frac{1}{2}$ below
10	M	28	150	0	0	$\frac{1}{2}$ below
11	M	50	175	0	air 10 oz	$2\frac{1}{2}$ above
12	F	30	110	14	8	$1\frac{1}{2}$ above
13	M	40	160	12	10	$2\frac{1}{2}$ above
14		25	160	0	air 10 oz	2 above
15	M	35	125	12	6	$2\frac{1}{2}$ above
22	M	40	160	12	8	1 above
23	F	50	110	15	12	3 above
24	M	40	120	12	8	3 above

In the last table we give the relation of the apex of the bladder to the crest of the pubes; in the first, the relation of the anterior peritoneal reflection to the same point. It must be remembered that the apex of the bladder and the peritoneal reflection are not always on the same level; in moderate distention of the bladder, the peritoneum passes down on its anterior surface a variable distance, depending upon the degree of distention and the firmness with which the bladder is pressed against the abdominal wall.

When the apex of the bladder is two inches above the crest, and the bladder pressed firmly against the abdominal wall, the peritoneal reflection is not more than three-fourths of an inch above the same point. With this degree of distention, however, the peritoneum is so loosely attached that it and its subjacent fatty layer can easily be slipped up without doing violence to either.



Rectal Bag.

The rectal bag used, which is shown in the cut, is made of pure rubber, with rather thin walls; when empty it is six inches in length by two and one-half inches in width; one end is somewhat rounded, to the other is attached a rubber tube, twelve inches long, for convenience in filling.

To introduce the bag, it is first oiled and then bunched together and folded over the index finger, when it is easily introduced just within the internal sphincter; a measured quantity of water is gradually and slowly injected with a bulb syringe.

As the result of these investigations the following conclusions are submitted:

1. In the normal condition, the bladder and rectum being empty, the apex of the bladder and peritoneal reflection are a little above the arch of the pubes.
2. In moderate distention of the bladder the anterior peritoneal reflection is below the apex; with the same degree of

distention and the bladder pressed against the abdominal wall, the peritoneum ascends higher.

3. Supra-pubic cystotomy can be most easily and safely performed when the bladder is lifted from the pelvic floor and moderately distended against the abdominal wall.

4. Distention of the rectum alone elevates the base of the empty bladder, but does not raise materially the vesico-abdominal fold of peritoneum.

5. Distention of the bladder alone, in thin subjects particularly, requires relatively a greater amount of fluid to elevate the peritoneal reflection. The bladder is not crowded against the abdominal wall, but rather falls away from it.

6. Moderate distention of both rectum and bladder meets the indication the best; from 10 to 12 ounces in the rectal bag and 8 to 10 in the bladder is generally enough, and seems to be a safe quantity to use.

7. Dilatation of the rectum first and the bladder afterward lifts the peritoneal reflection the highest.

8. The object of the rectal bag is to elevate the distended bladder and press it against the abdominal wall and so crowd up the peritoneum.

9. To meet the indication the gut should be dilated from the anus to near the promontory of the sacrum.

10. The rectal bag should be sausage-shaped, of rather thin rubber, rather than pyriform and thick, for the thinness enables it to follow up the gut, and the shape makes uniform pressure throughout the entire length.

11. In a very fleshy subject, with a flabby or pendulous belly, the bladder is relatively freely movable. In such a case it will easily rise out of the pelvis against the abdominal wall, when alone distended with a moderate quantity of water; the rectal bag may then be safely dispensed with.

12. Air, injected into the bladder of a subject, lifts the bladder and its peritoneal reflection out of the pelvis better than water; see cases ii, vii, xi and xiv.

13. In one case the gut was ruptured opposite the promontory of the sacrum with 23 ounces in the rectal bag (case xxi); in no case was the bladder ruptured.

14. In the cases reported an average of 14 ounces in the rectal bag and 12 in the bladder elevated the anterior peritoneal reflection an average of $1\frac{1}{2}$ inches above the crest of the pubes; the apex of the bladder was one inch higher.

In 25 cases reported by Dr. Helmuth in his monograph on suprapubic lithotomy, when the bladder alone was injected, the average quantity of water in each was 27 ounces, the peritoneum was lifted 2 and the apex of the bladder 4 inches above the crest of the pubes. In five of these cases rupture of the bladder occurred with an average of 59 fluid ounces.¹

DETAILS OF THE EXPERIMENTS.

The first thing done with each subject was to empty the

¹In the ANNALS OF SURGERY, Vol. iii, page 116, February, 1886, is an abstract of an article on Displacement of the Urinary Bladder by Tamponing the Rectum by Dr. Fehleisen. Allusion is here made to former investigators—Braune, Garson, Petersen, Mannheim, and Bergmann. Fehleisen placed a glass plate on the flat surface of a frozen median section and marked out the exact relations. Four, large, colored lithographs illustrate his results. In the first, the rectum was empty, and the bladder distended with nine ounces of fluid; the anterior peritoneal reflection was one-fifth of an inch above the crest. In the second the rectum was distended with sixteen and the bladder with six and three-fourth ounces of fluid. The anterior peritoneal reflection was one and a half inches above the crest. In the third the rectum was empty and twenty-one ounces were in the bladder. The anterior peritoneal reflection was three-fourths of an inch above the crest. In the fourth the bladder was distended with twelve and a half and the rectum with seventeen ounces. The anterior peritoneal reflection was three and one-fourth inches above the crest. Petersen concludes as the result of ten measurements, the bladder and rectum being empty, that the anterior peritoneal reflection is one and one-sixth inches below the crest. In ten other experiments, rectum empty and bladder distended with twenty and one-fourth ounces of fluid the anterior peritoneal fold was elevated above the crest, but little more than one-third of an inch. Petersen advises to first inject the bladder, then the rectum. Fehleisen reverses the order and recommends fifteen to sixteen ounces for the rectum and then eight to ten for the bladder. My own investigation of both methods convinces me that the latter plan is the best. The bladder can be lifted easier and higher by first filling the rectal bag and afterwards the bladder.

The general conclusions obtained by all these investigators coincides very closely indeed with my own. It is but justice to myself to say that at the time my own experiments were made I was not acquainted with the conclusions of others who had investigated the same subject. It is a source of gratification to me to see how closely we have all agreed in the practical features of the work, namely, that the anterior peritoneal reflection is lifted the highest when both rectum and bladder are moderately distended.

bladder and wash out the rectum. Fluid ounces of water were used to distend the gut by means of the rectal bag; the bladder was directly injected, a bulb syringe being used.

The relation of the anterior peritoneal reflection to the crest of the symphysis pubes is given by inches; also the relations of the upper end of the distended rectum to the promontory of the sacrum is given by the same measurement.

The following are the cases operated upon:

SUBJECT I.—Female in good flesh, 30 years of age, weighing 112 pounds.

Experiment 1.—First injected 12 ounces into the rectal bag, then 10 ounces into the bladder; the peritoneal reflection was $\frac{1}{4}$ of an inch below crest; bladder only moderately distended.

Experiment 2.—The amount of fluid in the bladder remaining the same, *i. e.*, 10 ounces, the fluid in rectal bag was increased from 12 to 22 ounces; the peritoneal reflection was even with the crest, and the upper end of the distended rectum was 2 inches below the promontory of the sacrum.

Experiment 3.—The amount of fluid in rectal bag remaining the same, *i. e.*, 22 ounces, the fluid in the bladder was increased from 10 to 22 ounces; the peritoneal reflection was $\frac{1}{4}$ of an inch above the crest; both bladder and rectum seemed to be distended to their utmost capacity: neither viscus was ruptured. Notwithstanding the unsafe quantity of water in the rectal bag and bladder, 22 ounces, the peritoneum was lifted only $\frac{1}{4}$ of an inch. I think this is explained when we see that the rectum was not dilated upward beyond a point 2 inches below the promontory of the sacrum; the bladder bulged backward over the upper end of the rectal bag. The bladder was not dilated high enough to throw the bladder against the abdominal wall. It is not so much the lifting of the base of the bladder that is required, as the throwing of the whole bladder forward; a high dilatation of the rectum does this best.

SUBJECT II.—Male, negro, well developed, weighing 160 pounds, dead 20 hours from typhoid fever; abdomen considerably bloated and tympanitic, not, however, because of post-mortem changes.

Experiment 1.—First injected 10 ounces into the bladder, then 12 ounces into the rectal bag; the peritoneal reflection was even with the crest.

Experiment 2.—The fluid in the rectal bag remaining the same, *i. e.*, 12 ounces, the fluid in the bladder was increased from 10 to 14 ounces; peritoneum elevated 2 inches.

Experiment 3.—The bladder and rectum were both emptied, the rectum remaining empty; the bladder was distended moderately with air; peritoneum elevated 3 inches.

SUBJECT III.—Male, large, very fat, pendulous abdomen, 25 years of age, weighing 220 pounds, dead 24 hours.

Experiment 1.—First injected 15 ounces into the rectal bag, then 10 ounces into the bladder; peritoneum elevated 4 inches; bladder only slightly distended.

Experiment 2.—The quantity of water in the rectal bag remaining the same, *i. e.*, 15 ounces, the water in the bladder was increased from 10 to 16 ounces; peritoneum elevated to the navel, bladder only moderately distended, rectum distended to the promontory of sacrum.

Experiment 3.—The water in the bladder remaining the same, *i. e.*, 16 ounces, the water in the rectal bag was increased from 15 to 18 ounces. Rectum dilated to a point 2 inches above the promontory of the sacrum: rectum not over-distended; no fibres ruptured.

SUBJECT IV.—Male, 50 years of age, weighing 150 pounds; dead 24 hours.

Experiment 1.—Injected 12 ounces into the rectal bag, peritoneum even with the crest; rectum moderately distended to one inch below the promontory of the sacrum.

Experiment 2.—The rectal bag holding 12 ounces, 12 ounces were injected into the bladder; peritoneum elevated $\frac{3}{4}$ of an inch.

Experiment 3.—Bladder emptied, water in rectal bag increased from 12 to 18, then to 23 ounces; rectum very much distended up to a point one inch below the promontory of the sacrum.

SUBJECT V.—Male, well developed, 40 years of age, weighing 150 pounds, dead 24 hours.

Experiment 1.—Injected first 6, then 12, then 18 ounces into rectal bag; peritoneum not materially changed in either case; when 12 ounces were in rectal bag, the rectum was dilated to the promontory of the sacrum; when 18 ounces were in it, it was dilated to a point 2 inches beyond. No experiments were made on the bladder, owing to a stricture of the urethra.

SUBJECT VI.—Male, 40 years of age, weighing 150 pounds, dead 36 hours.

Experiment 1.—Injected 12 ounces into the bladder; moderately distended; peritoneal reflection one-fourth of an inch below crest.

Experiment 2.—12 ounces remaining in the bladder, 6 ounces were injected into the rectal bag; peritoneum even with the crest; 6 ounces more injected into the rectal bag; did not materially change the peri-

toneum; rectum distended to within one inch of the promontory of the sacrum.

Experiment 3.—12 ounces remaining in the bladder, the water in the rectal bag was increased from 12 to 16 ounces; rectum distended to the promontory of the sacrum; peritoneum elevated one-fourth of an inch above crest.

Experiment 4.—16 ounces remaining in the rectal bag, the water in bladder was increased from 12 to 15 ounces; peritoneum one-half inch above crest.

Experiment 5.—16 ounces remaining in the rectal bag, water in bladder increased from 5 to 21 ounces; peritoneum elevated two inches.

Experiment 6.—Water let out of the rectal bag; bladder with its 21 ounces sinks into the pelvic cavity; peritoneum three-fourths of an inch above crest.

Experiment 7.—Both bladder and rectum being empty, bladder was moderately distended with air; peritoneum two and one-fourth inches above crest.

Experiment 8.—Rectum and bladder being empty, 10 ounces were injected into rectal bag, which distended it to a point one inch below promontory of sacrum. No effect on peritoneal reflection.

Experiment 9.—10 ounces remaining in the rectum, 6 ounces were injected into the bladder; peritoneum elevated three-fourths of an inch above crest. Water in bladder increased to 10 ounces; peritoneum elevated one and one-fourth inches.

SUBJECT VII.—Female, very fleshy and flabby, with pendulous abdomen, 50 years of age, weighing 190 pounds, dead 40 hours.

Experiment 1.—Rectum empty, bladder moderately distended with air; peritoneum one and one-half inches above the crest. On attempting to squeeze the air out of bladder through a small opening in the abdominal walls, the bladder was ruptured. It had not been over-distended with air.

SUBJECT VIII.—Female, 20 years of age, 130 pounds weight, in good flesh, accidentally killed 40 hours before.

Experiment 1.—Injected 12 ounces into the rectal bag, also same amount into the bladder; peritoneum elevated one and one fourth inch above crest; rectum distended to a point one-half inch below promontory of sacrum.

Experiment 2.—Bladder and rectum emptied; bladder distended with air till clear resistance was offered to the bulb of a Davidson's syringe. Apex of bladder within two inches of navel; peritoneum lifted two and one-fourth inches above crest; bladder not ruptured.

Experiment 3.—Bladder and rectum emptied; injected 12 ounces into the bladder; peritoneum lifted one and one half inches above crest.

Experiment 4.—Rectum empty; 18 ounces injected into the bladder; elevated apex of the bladder one-half way to navel; 30 ounces brought it to within one inch of navel; bladder very tight, not ruptured at 36 ounces.

SUBJECT IX.—Male, 45 years of age, weight 160 pounds; dead 36 hours.

Experiment 1.—Rectum empty, bladder distended with 10 ounces; made suprapubic cystotomy without seeing or injuring peritoneum; apex of bladder one-half inch below crest; picked up apex of bladder with forceps; when incised there escaped not more than two drachms of blood; bladder very loosely distended.

SUBJECT X.—Male, 28 years of age, weighing 150 pounds; 20 hours dead.

Experiment 1.—Bladder and rectum being empty, made suprapubic cystotomy without seeing or injuring the peritoneum; apex of bladder one-half inch below crest. In operating the cellular tissue in front of bladder was much more disturbed than if the bladder had been distended.

SUBJECT XI.—Male, 50 years of age, general anasarca, moderate ascites, weighing 175 pounds, 15 hours dead.

Experiment 1.—Injected into the bladder 8 bulbs of air from a Davidson syringe, moderate distention equivalent to 10 ounces of water, made suprapubic cystotomy without seeing or injuring the peritoneum; apex of bladder two and one-half inches above crest; peritoneum at least one inch above crest; bladder loosely distended.

SUBJECT XII.—Female, 30 years of age, 110 pound weight, dead 36 hours.

Experiment 1.—Injected 14 ounces into rectal bag, also 8 ounces into the bladder. Made suprapubic cystotomy without seeing or injuring the peritoneum; apex of bladder one and one-half inch above pubes and against abdominal wall.

SUBJECT XIII.—Male, of good muscular development, 40 years of age, weighing 160 pounds.

Experiment 1.—Injected 12 ounces into the rectal bag, also 10 into the bladder. Made suprapubic cystotomy in the usual way without injuring the parts, or seeing the peritoneum. Apex of bladder $2\frac{1}{2}$ inches above crest, and against the abdominal wall, rectum distended to within an inch of promontory of sacrum.

SUBJECT XIV.—Male, 25 years of age, good muscular development, weighing 160 pounds.

Experiment 1.—8 bulbs of air from a Davidson's syringe distended the rectal bag as much as 10 ounces of water. With the rectum empty, bladder distended with 8 bulbs of air, apex of bladder rose 2 inches above the crest, made suprapubic cystotomy without seeing or injuring the peritoneum. The bladder was only moderately distended, and by opening it the cellular tissue was disturbed considerably; bladder was not held against the abdominal wall.

SUBJECT XV.—Male, 35 years of age, rather small, but well developed, weighing 125 pounds.

Experiment 1.—Injected 12 ounces into the rectal bag, and 6 into the bladder. Made suprapubic cystotomy without seeing or injuring the peritoneum; apex of bladder $2\frac{1}{2}$ inches above crest and against abdominal wall, loosely distended; not more than half an ounce of water escaped when it was opened. No disturbance of cellular tissue back of pubes.

SUBJECT XVI.—(See plate No. 1.) Male, 35 years of age, weighing 100 pounds, bladder emptied, rectum washed out, put in the refrigerator of Rush Medical College. Seven days later, removed to the dissecting room, and made a vertical section with a saw. Anterior peritoneal reflection $1\frac{1}{2}$ inches below crest.

SUBJECT XVII.—(See plate No. 3.) Male, 35 years of age, 110 pounds weight, rectum washed out; bladder emptied, injected into the bladder 10 fluid ounces of plaster of Paris solution, and put into the refrigerator.

Seventeen days later, a section was made; anterior peritoneal reflection $\frac{1}{2}$ inch below crest, bladder not more than four-fifths full; air chamber above; air must have been there at the time of injection.

SUBJECT XVIII.—(See plate No. 4.) Male, 40 years of age, 140 pounds weight, bladder emptied, rectum washed out, injected into the rectal bag 15 and into the bladder 10 fluid ounces of plaster of Paris solution, put in refrigerator. On section seven days later anterior peritoneal reflection seven-eighths of an inch above crest of pubes, air space above level of plaster.

SUBJECT XIX.—(See plate No. 2.) Male 30 years of age, 140 pounds weight. Bladder emptied, rectum washed out, injected 15 ounces of plaster of Paris solution into the rectal bag, put in refrigerator. Fourteen days later, made section, anterior peritoneal reflection one inch below crest.

SUBJECT XX.—Boy 5 years of age, 30 pounds weight, bladder

emptied, rectum washed out, put in a refrigerator. Twenty-three days later, made section; anterior peritoneal reflection one-fourth inch below crest of symphysis pubis.

SUBJECT XXI.—Male, 40 years of age, 125 pounds weight.

Experiment 1.—12 ounces, injected into the rectal bag, distended the rectum to promontory of sacrum; water increased to 15 ounces, rectum distended to a point 2 inches beyond the promontory of the sacrum.

Experiment 2.—15 ounces remaining in the rectal bag, 6 ounces were injected into the bladder, peritoneum even with the crest; water in the bladder increased to 12 ounces, peritoneum elevated two and a half inches.

Experiment 3.—Water in the bladder let out, water in the rectal bag increased from 15 to 23 ounces, rectum distended to a point 3 inches beyond the promontory of the sacrum, muscular fibres gave way in a longitudinal direction on each side of the median line of the gut, and opposite to the promontory of the sacrum.

SUBJECT XXII.—Male, 40 years of years, 160 pounds weight, injected 12 ounces into the rectal bag, 8 into the bladder. Made a cut into the bladder without seeing or injuring the peritoneum. Apex of bladder 1 inch above crest, rectum distended to the promontory of sacrum. In this case considerable trouble was experienced in keeping the bag in the rectum on account of the lax and distended anus. When 6 ounces of water were injected, the bag began to bulge from the anus, and came out altogether, when 8 ounces were in. Reintroduced the bag and applied a compress to the perineum while 12 ounces were injected; then injected 8 ounces into the bladder. When the bladder was exposed, it was not distended, was very lax and fell away from the abdominal wall. It was opened with difficulty and considerable more laceration of the connective tissue back of pubes than was necessary had the bladder been comfortably filled and pressed against the abdominal wall. In the latter condition, as I have frequently observed, the bladder and abdominal wall are practically inseparable, the bladder lies at the bottom of the wound and bulges into it slightly when the transversalis fascia is opened: absolutely no separation of the connective tissue about the bladder made in such a case.

Let out the water from the bladder, increased the water in the rectal bag to 20 ounces, when the bag burst; the rent took place close to where the injecting pipe enters the bag; a round piece as large as the little finger-nail was completely torn out, a compress was held against the anus at the time and there was considerable pressure felt in the sy-

ringe! Trying to burst the gut with one hand in the abdomen I felt the large bowel distending two inches beyond the promontory of the sacrum. The gut was not ruptured.

SUBJECT XXIII.—Female, 50 years of age, 110 pounds weight, dead 5 hours, body yet warm. Injected 15 ounces into the rectal bag, and 12 ounces into the bladder; cut into the bladder without seeing or injuring the peritoneum. Apex of bladder 3 inches above crest, bladder only moderately distended, bag close against the abdominal wall; drew bladder into the wound and opened it; not one ounce of water escaped, showing the bladder was not much distended or pressed upon by the dilated rectum. Rectum distended to promontory of sacrum, and against the arch of the pubes tight enough to prevent the water in the bladder from escaping at the urethra. When the water was let out of the bladder, its base was easily explored with the index finger; it was not more than 2 inches below the cutaneous surface.

Experiment 2.—Put the bag into the vagina and injected 6 ounces into it. This dilated the vagina completely, but would have had no effect on the distended bladder, I think, or the distention did not follow up the hollow of the sacrum: the distention did not pass behind the bladder.

SUBJECT XXIV.—Male, 40 years of age, 120 pounds weight.

Experiment.—Injected 12 ounces into the rectal bag, and 8 into the bladder. This caused a slight bulging of the bag from the anus, and the bladder stood up well defined; there was considerable resistance felt in the syringe in filling the bag, but little or none on distending the bladder. Cut into the bladder, its apex was 3 inches above the crest, bladder lay close to the abdominal wall, and seemed to be fully distended: on opening the transversalis fascia the bladder bulged into the wound; 4 ounces gushed out when the bladder was opened, showing the bladder had been tightly compressed, rectum distended to promontory of sacrum.

SIMPLE AND COMPOUND INTERPHALANGEAL DISLOCATIONS OF THE FINGERS.

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OF LONDON.

THE chief interest attached to the treatment of these luxations arises more from the satisfaction of restoring to its normal function such an important part as the finger, than from the knowledge of having overcome a surgical injury in itself trivial.

Although such small anatomical parts are engaged, there is great difficulty often experienced in the treatment of these dislocations. This arises from two facts, (1) the part dislocated is of small size and permits of only a limited surface whereon to exert the necessary manœuvres for reduction, and (2) these are the points where great force, the result of muscular contraction acts with considerable mechanical advantage, and where of necessity ligamentous bonds of union are proportionately strong.

Again dislocations occurring in the fingers differ in some material respects from those observed in other parts. One is here dealing with a series of bones whose surroundings are so closely applied to them, that the space for dislocation in the ordinary sense does not exist; the skin forms a tight covering for all, and, should luxation occur, instead of taking place into a muscular plane, or a cellular space, it has of necessity (if not compound) to do so among very strong and tense anatomical structures. Moreover the movement of these joints is comparatively very extensive, and at the same time accurately defined so that in order to meet these requirements the ligaments are unusually strong and tense for articulations of their size. Further dislocation can only take place backwards, or at all events the main direction must be backwards, as, unless com-

pound, the bones cannot be dislocated forwards owing to the extreme amount of flexion permitted by the configuration of their articulating surfaces.

To glance briefly at the anatomical arrangements of these joints one finds that as far as ligaments are concerned the bones are held together by lateral slips, the anterior and posterior being mere rudiments and practically composed of nothing, save the synovial membrane. The function of these ligaments is performed by the flexor and extensor tendons respectively. In addition to these structures there exists in front of the joint a "sesamoid body" composed of fibro-cartilage, and mainly attached to the base of the distal phalanx to aid its movements. It has no attachment to the flexor tendon. When the finger is extended to a straight line the attachments of this body are tense. It plays the same part to these joints that the sesamoid bones do to others, and affords a "*point d'appui*" on which the flexor tendon acts at the commencement of flexion. If the joint be forcibly extended until the bones are at a right angle, the attachment of the sesamoid body to the proximal phalanx must be torn, and by the tension on the flexor tendon, is liable to be pushed into the joint between the two phalanges. The flexor tendon is also either ruptured or drawn down from the fleshy part of the muscle. By this means the extensor tendon is left unopposed, and although it does not necessarily keep contracted, still when any effort is made to replace the dislocated bone, it involuntarily is contracted and to a greater extent than one might imagine, impedes the reduction.

Having thus far explained some of the chief circumstances bearing on these points I will briefly record four cases which came under my notice.

1. Female, æt. 39. She had a dislocation backward of the second phalanx on to the dorsal surface of the first phalanx of the little finger. The injury had lasted 17 days, and was caused by having the fingers crushed against the wall while in the act of moving heavy furniture. She sought advice as she was unable to use the finger. The rigidity of the parts was extreme. All forms of traction failed and finally I made use of a manœuvre that in Mr. Wheeler's hands has been attended with

success in cases of Hey's luxation. By placing the dislocated joint on the edge of the table so that the dislocated bone should project beyond, and then fixing the hand, I then made pressure with the ball of the right thumb in the necessary direction, exerting the force against the base of the dislocated phalanx. The bone returned with a sudden jerk; the finger was then placed on a suitable splint and a few days subsequently the functions of the joint appeared quite normal.

2. The second case was that of a noted pugilist. He fell, while walking down the street, "on the points of his fingers," to use his own expression. The terminal phalanx of the thumb was dislocated backward, and to the radial side of the proximal phalanx. The fold of skin between the thumb and index finger was thrown into strong profile. Attempts at reduction by traction failed, as did also extreme flexion and extension. It was reduced by steady pressure exerted by the surgeon's thumb on the bone of the dislocated phalanx in a direction contrary to that the dislocation had taken.

3. The third case was a compound luxation of the ungual phalanx of the right index finger forward, the result of the finger being caught in a door. The subject of this injury was a young gentleman who had passed the examination for the Civil Service of India on probation. The deformity was easily reduced, but the extensor tendon had been cut across and the ends of the bones somewhat injured. The case appeared most unfavorable, but as he was anxious to preserve his finger intact, I resected the joint and obtained a complete recovery with very little shortening. Perhaps the best proof of the success that attended the proceeding is that Sir William Gull passed him as fit at a subsequent physical examination.

4. The recipient of this injury was an artillery man. He fell, while walking with a drunken friend. In endeavoring to save himself, he stretched out his hand, and received the additional weight of his companion who fell with him. He paid no attention to the injury till next morning, and when he came under observation his hand was covered with mud. He had sustained a compound luxation backward of the terminal phalanx of his thumb. There was extreme swelling of all parts of the thumb, and all efforts made at reduction failed utterly. I consequently gave him treatment calculated to allay the inflammation and quiet the nervous system. The following day he returned, complaining of pain running up his arm, and the swelling had advanced considerably upward. The usual attempts at reduction failed as before. I, therefore, tenotomized the extensor secundi internodii pollicis, as it emerges from beneath the posterior annular ligament. I

chose this position because the tendon could be easily localized there, and also because it was well removed from the seat of inflammation. Reduction was now easily effected. Considerable inflammatory action occurred in the seat of dislocation, but the progress to recovery was uninterrupted. I have seen him since, and except that the joint is somewhat stiff the thumb is as useful as ever.

If we consult the great surgical authorities on this subject, we find that although most of them acknowledge the difficulties attending the treatment of these injuries, (and I wish to lay stress on the fact that I am excluding dislocations occurring at the metacarpo-phalangeal joints), very few suggest any definite line of treatment. Thus Erichsen states that he does not believe simple dislocations of the ungual phalanx from the second can occur.

Nélaton has only known of four cases, and states that one of them, although seen early and treated by some of the best Parisian surgeons, remained irreducible. He states further that he only saw one himself (compound) which remained unreduced. He advises the removal of the articular ends to facilitate reduction.

Agnew also advises the removal of the articular ends in compound cases "if the phalanx cannot be replaced with entire ease, or when restored to position has a tendency to relaxation." In the only case Gross saw, although he reduced it, he had finally to resort to amputation.

In Hamilton's work on dislocations he says, "such injuries attended with laceration of the integuments may occasionally require amputation or resection of the bones." Mr. Pickering Pick recommends amputation if the soft parts are freely destroyed.

In Dr. Terrillon's work (*Leçons Cliniques*) on the effects of muscular action in dislocations he states that Bell, Hey (*Archives of Medicine*, 1867) Valentine, Vast (quoted in Hamilton) and Dieffenbach (*Medicin Zeitung* 1840), all practice subcutaneous section of tendons in order to aid the reduction of dislocations of a recent or old standing, but the dislocations referred to are those of the larger joints. In the *Leçons Orales* (ii, p. 46) Dupuytren says, "although at first sight interphalan-

geal dislocations appear of trivial consequence yet they often become of extreme interest owing to the difficulty of reducing them and in some cases the inability to do so." He concludes the difficulty arises from the interposition of the flexor tendon, believing the lateral ligaments are invariably torn, and he recommends as the only remedy for this section of the flexor tendons in close proximity to the joint.

Professor Humphry mentions two cases that occurred in the practices of Bourbon and Roun, and in these the difficulty was produced by the intervention of the sesamoid body. He also says that he found it necessary to introduce a hook and draw the sesamoid forward before reduction was completed.

In the *Gazette des Hôpitaux* M. LeBlanc records an interphalangeal dislocation successfully treated by the method advocated by Guermontprez which consists of pushing the dislocated parts back with the thumbs, the index fingers tightly grasping the phalanx from which the dislocation has occurred as a counterforce. Velpeau says (*Bulletin gén. de thèrap.*) with reference to these luxations occurring in the thumb, "some of them return as by magic, but others remain irreducible in spite of the most persistent and well directed attempts."

With reference to the treatment I adopted in these cases some may question the advisability of tenotomizing the opposing muscle, when we have the relaxation produced by anæsthetics to fall back on. No doubt while anæsthesia exists the reduction may be accomplished, but when one or more tendon has been left unopposed there is great liability for the deformity to return as soon as the effects of anæsthesia have passed off.

Most of the apparatus that have been invented to effect reduction in these cases are useless because they all act by traction. Thus Levis' apparatus, the Indian puzzle, Charriere's forceps, etc., act in this way, and the reason their application is so often followed by disappointment, is (in cases of interphalangeal dislocations) the result of two causes: firstly, the inability to exert sufficient force owing to the limited surface on which to get a purchase, and, secondly, that all attempts made by traction on the dislocated part only tend, by tighten-

ing the ligaments, tendons and other structures to increase the immobility of the parts.

Judging from the experience I obtained from the above cases., I think in simple dislocations the best means to obtain replacement is direct pressure exerted by means of the thumbs on the dislocated part, and failing to reduce in that manner tenotomizing of the extensor tendons, for it is only in dislocation backwards that there is any difficulty in reduction, forward dislocation being impossible unless compound in which case the extensor tendon is always torn. The tenotomy further aids the treatment, as it allows perfect rest to the parts which in the case of compound dislocation is so essential.

Should the dislocation be compound, and especially if the cartilaginous ends of the phalanges be injured, I think the best results will follow the removal of as much of the cartilaginous surface as possible by means of a scalpel.

EDITORIAL ARTICLES.

TETANUS: ITS NATURE AND ORIGIN.

Is tetanus essentially a disease of the blood or of the nervous system? Is it infectious or not? Is the tetanus of horses identical with that of man? These are questions which have long been before the profession; and for years there have been persons ready to give an affirmative, and others a negative answer to each of these questions. That tetanus is infectious in horses has been more readily and frequently held than that it is in man. I have heard of a series of 17 cases which occurred, one after the other, in the same stable. That it is infectious, or, rather, in some manner contagious, in man I have believed ever since I observed an epidemic of it in the West London Hospital, extending over several years prior to and including 1881. In November that year I delivered an address before the Abernethian Society, of which the following abstract appears in St. Bartholomew's Hospital Reports for the corresponding year (Vol. xviii, p. 399):

"He (the speaker) urged as evidence of tetanus being primarily a blood-poisoning, the almost constant fact of a wound being discoverable, the possibly constant fact of a wound having been present at some period of every case, the regularity of what might be termed the period of incubation in tetanus neonatorum, the regular order of the first appearance of its local symptoms (comparable to the method of invasion of a scarlatina rash), the (alleged) occurrence of a peculiar smell, the rise of temperature, the influence of climate, the recurrence of the disease endemically and epidemically. The structural changes in the cord, inasmuch as they have been observed to lie chiefly round the blood-vessels, also suggest a poison circulating in the blood."

* * * "The changes in the kidneys, and the clear state of the mind are further evidences. So, also, to some extent, is the fact that

children suffering from undoubted blood poisoning have convulsions, although adults have rigors. There is greater difference between 'convulsions' and rigors than there is between 'convulsions' and tetanus."

"Finally, a short notice was given of how an epidemic of tetanus at the West London Hospital was apparently eradicated by hygienic measures."

The conclusion of this last sentence should have read as follows: "by hygienic *and antiseptic* measures." For some years before and including 1881, the mortality of operation cases and compound fractures from tetanus at the West London Hospital had been quite extraordinary. I am unable to give the exact figures, but my colleagues of that time, as well as the house-surgeons will confirm the statement. In that year, at my request, a meeting of the medical council of the hospital was summoned to consider the question whether something could not be done to remove the pest. As a result, antiseptic methods of a far stricter kind, and antiseptic materials and appliances of an improved quality were introduced. Some months were occupied in bringing this about, owing to the dilatory nature of the government by committee. During these months two of my patients were attacked with tetanus and one of the two died. From that time to this, nearly six years, not a single patient of mine has been attacked with tetanus.

During the epidemic in question I noticed particularly that almost every patient with tetanus had at the same time symptoms of either local or general septic infection. There was either suppuration, or inflammatory redness, or lymphangitis, or something of the kind.

During the same unhappy years, there were scores of simple fractures, in some of which the bones were most severely crushed and splintered in the immediate neighborhood of large nerves, such as the ulnar. None of these had tetanus.

I am absolutely convinced that those who suffered did so in consequence of something which was conveyed to the wound, and that in some, if not all, of the cases which commenced in the hospital, the evil influence was implanted by either the house-surgeon, the dresser, the nurse or the surgeon himself. As a proof of the latter statement

may be taken one of my cases in which the patient was attacked after a sinus leading down to carious bone had been enlarged and the bone treated by gouging and the free application of pure carbolic acid. This patient could not have brought his infection into the hospital with him. As he recovered, it is probable that the infection was in his case slight.

Recently in France, Professor Verneuil has put forward the hypothesis that *tetanus in man is derived from the lower animals*, which, of course, includes the idea of its being infectious. In the *Revue de Chirurgie* for October, 1887, is a long and comprehensive paper in which the distinguished French surgeon gives short and pithy abstracts of a large number of observations furnished to him by his compatriots. He arranges them in four series, illustrating respectively the four headings under which he classifies his remarks,

These headings are as follows :

1.—*Professions which specially expose wounded persons to the danger of contracting tetanus.*

2.—*Concerning the inoculation of tetanic virus by the instrument which inflict the wounds or by applications probably contaminated with this virus.*

3.—*The transmission of tetanus from the horse to man, from man to the horse, from man to man.*

4.—*Consideration of negative cases.*

Professor Verneuil had previously published his general views of the nature and origin of tetanus in the *Gazette hebdomadaire* and at the *Congress of French Surgery*. The article in the *Revue de Chirurgie* is devoted to the development of his opinions in detail, and to the registration of facts.

Extensive enquiries have been addressed to country surgeons and veterinary surgeons in France during the past year, and the result has been the collection of more than two hundred observations.

It is to be borne in mind that the set of questions sent out by Professor Verneuil appears to have implied a request that the relations between human and equine tetanus should form a special subject of examination. But even when these relations do not seem to exist they are to be noticed when intelligently looked for.

Among the 200 observations certain occupations of the sufferer are so common, and certain modes of receiving the injury so frequent that Mr. Verneuil feels driven to the conclusion that after different forms of accident, and in the case of persons of different professions, there is great inequality in the respective liability to contract tetanus. His object at present is to show that, given a case of human tetanus, there are two chances to one in favour of the possibility of tracing it to equine influences (*de romanter jusqu'au cheval*).

According to him, this equine influence is exercised in many ways, some direct, others indirect.

1. When a man is wounded by an instrument which has been used on a horse.

2. When he has been bitten or wounded by a horse.

3. When, being wounded, he has remained in more or less continued contact with a horse.

4. When he is wounded by a fall from horseback or from a vehicle.

5. When, being wounded in some way, his wound is contaminated by horse excrements or by earth impregnated with them.

6. When his occupation brings him into constant contact with horses, with their excrements or with earth impregnated with the latter.

Verneuil broadly divides his cases into *four classes*, as follows :

The *first* includes persons, by profession, habitually in contact with horses, such as car-men, farm-servants, stablemen, farmers, labourers, farriers, horse-dealers, veterinary surgeons, knackers, etc., and, supplementary to these, persons working regularly upon land cultivated with the aid of animal manures, and above all with horse dung, such as gardeners of various kinds, as well as navvies.

In the *second* category are placed persons, of whatsoever profession, whom chance has brought into passing contact with either healthy or sick horses ; who have been wounded by these horses or by appliances used daily on or with the animals, *e. g.*, harness, whips, carriages, agricultural implements ; or whose wounds have been soiled by horse excrements or by earth impregnated with them. In this class are included a long list of persons with tetanus after injury by

horse-bites, kicks, dressings made with dung, street-dirt, stable-runnings, immersion of the wound in water from horse-ponds, cattle-troughs, etc.

In the *third class* are grouped all persons with tetanus who have been in relation, more or less direct with other persons (or animals) with tetanus. The study of these leads to that of the question of the transmissibility of tetanus from the horse to man, perhaps from man to the horse, certainly from man to man.

The *fourth class* includes the cases, still rather numerous, in which no relation, direct or indirect, can be traced between the wounded man, on the one hand, and, on the other hand, any man with tetanus, any horse sick or well, or any article connected with the soil.

M. Verneuil believes that negative cases will become more and more rare when observations are made more minutely and when it is better known what objects, animate and inanimate, may receive and preserve the tetanic virus. He is confirmed in this belief by the fact that when the observations sent to him have been recent and few in number, they have generally been in accordance with his theory, but when, on the other hand, they have extended back for years and included a long series of observations, they have not been so confirmatory. M. Verneuil finishes this naïve paragraph with the statement that he has been accused of putting forward only such facts as appeared to support his argument, while keeping in the background such as were opposed to it. He proposes, however, to afterwards examine the latter class of facts with care, and says he shall do so "*en revanche*." Would not gratitude have been a more suitable word than "revenge" here?

A possible objection to M. Verneuil's investigation is that it practically ignores all the cases hitherto published and deals only with his own fresh collection. To this he replies that the study of infectious and contagious maladies is much more simple and much more fruitful in small centres than in great. He adds that no one can suppose that his friends would choose to send to him only such observations as would be agreeable. Perhaps not, but still there must be many people

in rural France, as elsewhere, of a complaisant nature, and especially complaisant to persons of M. Verneuil's great position.

Returning now to the cases, it appears that

The first class form more than half the observations collected. This fact furnishes the strongest argument which as yet exists in favour of the theory. One hundred and eleven cases are included in this class, and a few lines are devoted to each. Want of space forbids the translation of them, one by one.

Many of them are very striking, for instance when the wound has been dressed with horse dung or when horses have died of tetanus in the same building a short time before the injury has occurred to the human patient. But no just idea can be formed of the value of these cases until one hears what M. Verneuil has to say respecting the cases which appear to negative his theory. These he promises to deal with in a future number.

At present he seems to have hurled his hypothesis in the face of critics and sceptics, as Douglas threw the Bruce's heart amid the Saracens. Crying "forward, brave heart," and shouting to the country doctors of France to follow, he charges to the rescue. This is one way of pursuing scientific truth, it is either sublime or ridiculous. The ultimate result will decide which. There seems to be much at present in favour of Verneuil's view, and his paper is well worth studying in connection with the experimental enquiries which other surgeons have been and are making into the nature and origin of tetanus.

C. B. KEETLEY.

INDEX OF SURGICAL PROGRESS.

CHEST AND ABDOMEN.

I. Cholecystotomy. By J. J. PRINGLE, M. D. (London), and A. PEARCE GOULD, F. R. C. S., (London). At the time of the operation the patient, a woman, æt. 55, was suffering so much from pain, sleeplessness and digestive troubles, and was emaciating so rapidly that her only hope of relief seemed to lie in an exploratory operation.

Under ether Pearce Gould opened the abdomen by an incision four inches long at the upper part of the right linea semi-lunaris. Full antiseptic precautions were used, excluding the spray. The liver was found to be enlarged and the gall bladder obscured by firm adhesions. After these were dissected away the gall bladder was reached; it was contracted and contained two drachms of pale bile and mucus which were withdrawn by aspiration; when opened it was found to contain no gall stone. Owing to the depth at which it lay and to adhesions the gall bladder could neither be brought to the abdominal wound nor satisfactorily stitched together, its fundus was therefore freed from the liver, ligatured and cut off, the peritoneal edge of the stump being stitched over the cut mucous membrane with fine catgut. At a deeper level a gall stone was felt but it was so movable that it could neither be grasped and crushed nor pushed into the duodenum. The peritoneal cavity was then sponged out and the wound closed. The patient did not rally from the operation. She had intense pain about the wound relieved only by morphine, and developing "severe acute general bronchitis." Death in fifty-four hours.

At the post-mortem examination it was found that the divided cystic duct had leaked allowing the escape of bile-stained fluid which, however, had been shut off from the peritoneal cavity by recent adhesions. There were no signs of general peritonitis. The common and hepatic ducts

were enormously dilated into a continuous tube from the liver to within an inch of the duodenal orifice which was patent. Lying in the tube was a cylindrical gall-stone 1 inch long and $1\frac{7}{8}$ inches in circumference; it was shaped like a conical rifle bullet and weighed when dry 27 grs. A small probe was with difficulty passed from the cystic into the common duct. Both lungs were studded with subpleural hæmorrhages and extensive areas of collapse and broncho-pneumonia; the bronchi contained much frothy mucus.

This condition of the lungs it was believed had been the main cause of death and was attributed to the agency of the ether which had been administered as the anæsthetic. Had the depth of the wound and the number of adhesions not prevented the movable stone from being grasped with padded forceps, the firm condition of the walls of dilated duct would have allowed it to have been crushed through them with a good prospect of success.—*Lancet*, December 4, 1886.

II. Richter's Hernia. By F. TREVES (London). By this is meant a form of hernia where a part only of the circumference of the small intestine is engaged in the hernial orifice and there strangulated. The part included is that furthest from the mesentery. This form is commoner in women than in men, and in femoral than in inguinal hernia. It is limited to adults, and may be either old or recent herniæ. The clinical and pathological conditions described were based upon the accounts of thirty-three recorded cases. The symptoms are milder than in other forms of strangulation; vomiting slighter, less frequent, often later in onset and very rarely feculent. Hiccough uncommon. The bowels may remain open throughout strangulation, or may act occasionally, or respond to aperients. Sometimes there is persistent diarrhoea. Tympanites is uncommon. The hernial tumor is very small, often not recognized. Gut is irreducible by taxis; reduction en masse not infrequent. Mortality very high, *i. e.*, 62.2%, probably from difficulty of diagnosis, irreducibility of the gut and frequency of gangrene. Mortality after herniotomy proportionally high.—Abstract of paper read at the Medico-Chirurgical Society, December 14.—*Lancet*, December 18, 1886.

III. Cases of Laparotomy for Relief of Intussusception.

By L. KNAGGS, F.R.C.S., (London), and Mr. DENT, (London). 1. A boy æt. 5½ years had presented symptoms of bowel disturbance for a week culminating in marked signs of intussusception. After two days persistence some temporary relief followed inflation of the bowels, with return of all symptoms in a more aggravated form in twenty-four hours. The abdomen was then opened in the middle line, and a tight intussusception of the ilium which was in turn invaginated loosely for three or four inches through the ileo-cæcal valver. As efforts to relieve the intussusception failed, it was cut off, and the mesenteric vessels being ligatured, the open ends of the gut were stitched to the wound. The child did not rally and died in an hour and a half.

In his subsequent remarks the author adduces a number of fatal cases of intussusception, and shows that besides the danger of shock, the risk of rupturing the intestine by forcible distention with air or water is considerable, especially in young infants (under a year), apart from the possibility of ulceration or gangrene having already begun. In order to judge of the success inflation various indications have been brought forward, but Knaggs holds that much depends upon the position of the tumor. "If it is in the descending colon, the invagination is almost certain to be one of the large intestine, or of the ileo-cæcal variety, and in the large majority of instances of the successful employment of inflation or enemata that I have met with, the tumor was stated to have been situated on the left side or felt per rectum. If, however the tumor is on the right side or near the median line on the right side, there must exist considerable uncertainty as to its variety, and therefore disappearance of the tumor with distention of the abdomen must leave it doubtful whether the tumor has been disinvaginated or only obscured." "Sudden uniform distention of the abdomen is the most obvious sign that rupture has occurred."

Should harm or no good result from inflation the abdomen is to be opened without delay. Two tables are drawn up, one of eight successful cases after abdominal section, and the other of twenty-nine unsuccessful cases. From these the author concludes that the longer the continuance of acute symptoms the greater the patient's exhaustion,

and the greater the risk of sinking after the operation.—*Lancet*, June 4 and 11, 1887.

2. A case, reported by Mr. Dent, of St. George's Hospital, was a child, æt. 6 months, who for seventy-two hours before admission to the hospital had suffered from evident intussusception. Enemata had appeared to produce a good effect for a time, but it rapidly passed off. When the abdomen was opened a loop of bowel was found constricted by the sharp edge of a piece of mesentery of the ilium which was invaginated into the cæcum; the band was divided. The special features of the case were:

(1) That the intussusception was ileo-colic as well as ileo-cæcal.

(2) That there was the additional complication of internal strangulation.

(3) That the intussusception was easily reduced by operation.

Peritonitis had set in before the operation and the patient died in five hours after it.—*Lancet*, May 21, 1887.

IV. Colotomy for Malignant Disease of the Rectum. By Mr. H. CRIFFS (London). The patient, a woman, æt. 50, was first seen by the operator December 5. Her symptoms had begun in spring by pain in the back, followed by pain in defæcation, and afterwards by characteristic symptoms of rectal stricture. For three inches above the anus the bowel was healthy; then a firm, nodular mass, adherent to surrounding parts, could be felt, with an aperture admitting only the tip of the finger. She left hospital, but returned February 1, 1886, weaker, with symptoms aggravated, and the mass increased in size. February 8 lumbar colotomy was performed. For a week no fæces came by artificial anus. Then some came by both new and old openings. When discharged on March 8, 1886, everything came by the artificial anus. In April, 1887, she was much improved in health and strength in spite of an increase in the local growth. She had one good motion daily, and was able for her domestic duties. The artificial anus admitted the forefinger easily. Mucous membrane on a level with surrounding skin, which was soft and dilatable. The patient could control the opening, and had no involuntary escape.

In his subsequent remarks, Mr. Cripps states his belief that cases of rectal cancer are unsuitable for excision where the disease is not within easy reach from the anus, and where the tissues surrounding the bowel are involved. In such cases colotomy not only relieves from the symptoms of stricture, but gives rest to the affected part and so diminishes the activity of the malignant growth. The operation should be performed as soon as symptoms of stricture appear. The following are the details which Cripps believes contribute to a favourable result, as in this case. (1). There should be a minimum of fibrous tissue round the wound. This can be attained when the wound heals by first intention and when the skin and mucous membrane are directly united. When there is an interval it must be formed by granulation tissue. This will be followed by contraction. (2). The opening down to the gut should be made valvular by dividing the skin on a lower level than the fascia. (3). During healing any tendency to contract should be met by inserting a plug into the artificial anus.—*Lancet*. April 23, 1887.

CHAS. W. CATHCART (Edinburg).

V. The Surgery of Malformations of the Anus and Rectum. By M. JEANNEL (Toulouse). From a detailed study of the subject, the following results are obtained: 1. Among the various malformations of the anus and rectum, some are simple of diagnosis and others difficult.

(1). Those which are simple of diagnosis are:

- a.* All malformations affecting the anus alone;
- b.* Partial or total persistence of the cloaca;
- c.* Permeable constriction of the rectum; the simple horizontal partitioning of the lower extremity of the rectum, with a well-formed anus.

(2). Those which are difficult of diagnosis are:

a. Absence of the rectum, complicated or not with anal malformation:

b. Extended imperforation or atrophy, and double partitioning with or without intermediate constriction of the rectum, complicated or not with anal malformation.

2. For malformations of difficult diagnosis, a study of the micturition furnishes indications of great importance.

3. If no anus exists and if the rectal ampulla cannot be felt in the perineum, the deep urethra may also be wanting; there is then a malformation caused by absence of the primitive bud of the anus. In this case the intestinal cul-de-sac exists in the true pelvis and is probably in communication with the bladder; it should be reached through the perineum.

4. Total or partial absence of the rectum is distinguished from imperforation or atrophy of the rectum by the constant coexistence in the boy, of an intestino-urinary communication, and in the girl of a vulvar anus.

5. There is no precise sign by which the height can be diagnosed at which the terminal cul-de-sac of the rectum is to be found in case of imperforation, atrophy or double partitioning of the rectum.

Perineal fluctuation, if the anus is absent, or fluctuation at the bottom of the anal cul-de-sac, if one be present, are observed but rarely and when the rectum is partitioned or atrophied to a small extent only.

In case of absence of the rectum, the ischia are the more frequently found to be brought abnormally near together.

However, exploration by the bladder or the vagina might give valuable indications; if the bladder or vagina fills the sacral hollow, the intestinal cul-de-sac is very high and colotomy is necessary.

6. In case of absence of the rectum, if there be a communication with the bladder, the gut is high up and colotomy is necessary forthwith; if there be a urethral communication, the gut is low and a perineal operation is required.

7. In case of vesical communication, there is a great possibility of the coexistence of a malformation of the ureters and the genital canals.

8. The diagnosis between intestino-vesical communication and recto-urethral communication is very difficult indeed to establish, especially as the necessity for surgical intervention is urgent and there is no time for a complete and detailed observation of the urinary function; the rules for the differentiation of hæmaturia and urethrorrhagia should be put in practice here.—*Revue de Chirurgie*, March and April, 1887.

JAMES E. PILCHER (U. S. Army)

EXTREMITIES.

I. Treatment of Retraction of the Palmar Aponeurosis. By Prof. KOCHER (Bern). That Dupuytren's finger-contracture does not depend on changes in the flexor-tendons is everywhere acknowledged. But amongst German writers there has been quite a dispute as to the relative participation of the palmar fascia and the skin. Kocher reports 4 cases operated by simple longitudinal incision of the skin and excision of the fascia. In this way he was better able to examine the parts in situ and later, through Prof. Langhaus, also histologically. The affection begins in a few foci. These lie partly in the aponeurosis itself, partly in the adjoining tissue. In the latter there is a proliferation of nuclei in the walls of the arteries, and also capillaries, on which a subendothelial very nuclear adventitia develops. In the aponeurosis the vessel carrying connective tissue increases and thickens and the cells multiply. The process even penetrates the fat tissue, by way of the capillaries. Though leucocytes were not found, yet the process might be called a chronic-plastic inflammation starting from the palmar fascia. The elasticity of the skin, is preserved, although it may at some points become secondarily involved. He holds that the correct procedure for the radical cure of Dupuytren's finger-contracture, resp. of retraction of the palmar aponeurosis consists in thorough extirpation of the thickened and shortened palmar fascia with its extensions, after simple longitudinal incision of the skin. This method is especially applicable in the early stages. His cases gave good results, though further limbering of the finger by manipulation, etc., was necessary, and some weakening of the fingers was not excluded. No operation, unless it include prophylactic excision of healthy parts of the fascia, can guarantee against relapses.

Gersung (1884) reported a successful case operated in like manner. —*Centbl. f. Chirg.*, 1887, Nos. 26 and 27.

II. On the Transplantation of Fresh Pedunculated Flaps, etc. By Dr. W. WAGNER (Königshütte). After restating the principles laid down by Maas [v. ANNALS, June, 1885, pp. 572-3] for this class of operations, W. proceeds to give 3 cases in which he success-

fully filled defects on the arm by flaps from the chest. In the first case the ulceration (from traumatic splintering of the ulna, severance of both wrist-arteries and destruction of skin to above the elbow) two flap operations were necessary. This patient complained greatly of the pain from prolonged fixation—by plaster—of the arm to the chest; the other two were not so much troubled in this regard. The connecting pedicle was served in 13, 12, 14 and 14 days respectively. W. does not lay as much weight as did Maas on careful stitching of the flap to its new surroundings, but considers it all-important that the flap lie firmly on the subjacent tissues. He urges the great value of this method in conservative surgery, large indolent ulcers and cases where contracture might result or become permanent.

In the discussion Hans Schmidt remarked that plastic operations near joints—for preservation of their mobility—should be made early, before the changes from inactivity have taken place.—Proceedings of XVI Germ. Surg. Cong. in *Centbl. f. Surg.*, 1887, No. 25.

GENITO-URINARY ORGANS.

I. On the Operative Treatment of Urinary Fistulæ (Urethral and Vesical). By A. WÖFLER (Graz). After referring to previous methods and giving cases he sums up as follows: (1). Longitudinal and transverse defects of the permeable urethra demand sagittal or transverse urethrorrhaphy. (2). Such defects in an impermeable urethra call for circular resection and suture. (3). Where an impermeable urethra is resected and the distance between the ends proves too great for direct suture, the ends are to be gradually approximated by cuneiform excisions from the body of the penis. (4). In many cases of vesico-vaginal fistula it will be better to carefully prepare back the edges of the bladder and perform direct cystorrhaphy. In general he proceeds the same as in suture of the intestine.—Proceedings XVI Germ. Surg. Cong. in *Centbl. f. Chirg.*, 1887, No. 25.

WM. BROWNING (Brooklyn).

II. The Closure of the Vesical Wound After Suprapubic Cystotomy. By Dr. ALEXANDER BRENNER (Vienna). An experimental study in order to determine the most feasible mode of

closing the vesical wound in suprapubic operations on the bladder. The axiom that a bladder suture to be of any value must be a hermetical one (Grayson), has stimulated to the discovery of some other method of closing the vesicle wound than the one now in vogue. The experiments were made on the human cadaver and on dogs. The bladder was incised (after the ordinary methods of raising it into contact with the abdominal walls) to an extent of 2 to 3 centimeters in dogs. In the human cadaver the wound measured 4 to 5 centimeters, the bladder wound being fixed with tenacula or silk loops; the mucous membrane of the bladder was then drawn forward and isolated to an extent from the muscularis. A continuous suture (silk) was then passed around the border of the incision and running parallel to the free edge. The suture was passed 2 to 3 mm. from the free border of the incision and only through submucous connective tissue not going into the cavity of the bladder. [The drawing of such a suture and wound would resemble very much the appearance of a purse or pouch closed with one string. ED.] The free ends of the suture are then tightly drawn.

A second suture has been previously passed through the muscularis in an exactly similar manner. The suture in the mucosa being tightly drawn a mucous surface is brought into contact with mucous surface; the folded mass gives a stump with a rosette-shaped top. To prevent slipping the suture at the angles of the incision is passed further from the free edge of the opening (4 mm.) than at other points of the wound. The wound in the muscularis is left somewhat folded and smaller after the above procedure. The second suture of the muscularis is now tightened and the tissue of the mucosa stump covered by the muscularis. The interior of the bladder has an irregularly folded appearance, but it is not very much diminished in capacity. The above sutures were efficient when the bladder was filled artificially to the bursting point. The suture on the whole was satisfactory in the cadaver and on the dogs. It is hard to predict the effects which may be caused by the folding of the mucous lining of the bladder. If adopted, however, and feasible this suture may dispense with the introduction of the permanent catheter. Only two sutures are used, and a strong cicatricial stump results in the site of the incision.

HELFERICH (of Greifswald) in a critique on the above calls attention to the facts that the tight ligature of the diseased human bladder may give rise to areas of gangrene despite assertions of the author to the contrary; and again the permanent catheter has of late years been dispensed with where our present mode of sutures have given good and satisfactory results. Lastly, the artificial distention of the bladder is a misleading criterion of the efficiency of any suture.—*Fortschritte der Medicin*, No. 17, 1887.

II. KOPLIK (New York).

III. The Diagnosis, Early Treatment and Radical Cure of Intra-Vesical Growths. By Professor GUYON (Paris). Hæmaturia which is uninfluenced by external circumstances may be taken to be pathognomonic of vesical neoplasm. Where hæmaturia is renal there is always the pain of renal colic. Where there is great renal enlargement there is commonly varicocele. Where the kidney is much enlarged bimanual examination will detect it, but where the increase in size is slight, the author is able by means of two fingers in front and the other hand on the flank to appreciate a renal ballottement owing to the fact, which he asserts, that an enlarged kidney is always more mobile than a healthy one. The bladder may, when empty, be examined by a finger in the rectum and a hand deeply pressed down above the pubes.

Positive information as to the fact of hæmorrhage from the bladder itself may be obtained by withdrawing the urine, washing out the bladder and then observing a bloody discoloration of the injected fluid on making moderate pressure on the bladder from above.

Negative results from exploration with a metallic sound count for nothing.

Vesical growths arise almost invariably from its base, and they early infiltrate the bladder walls so that only those of the size of a pea or bean will be found confined to the mucous coat,

At a certain period of their growth they are separated from the deeper tissues by a newly-formed fatty layer. This layer is the guide of the surgeon in extirpating them from within, and its form will render his wound spoon-shaped, *i. e.*, wider at the surface than at the base.

The great difficulty in dealing with a basic growth is to avoid interfering with the ureters, complete extirpation being practically impossible. Excision of the projecting portion and scraping and cauterization of its base are the best means available.

The lecturer strongly urges early operation in cases of vesical growth — *Le Prog. Méd.*, Jan. 29, 1887.

A. F. STREET (Westgate).

IV. Cutaneous Lesions of the Genitals Due to Diabetes.

By A. FOURNIER (Paris). Pruritus of the genitals in both sexes is so often due to diabetes mellitus that the writer lays down the rule in all cases of this affection to examine the urine; he adduces several cases in which treatment of the constitutional disease alone produced any alleviation of this distressing affection. But besides causing pruritus and eczema (with or without the presence of cryptogamic parasites), diabetes leads occasionally to gangrenous ulceration of the genitals. A man came to the St. Louis Hospital with sloughing of the glans penis; venereal contagion was excluded, and his urine was found to be full of sugar. Anti-diabetic treatment with iodoform and the continuous immersion of the genitals soon led to marked improvement. A similar case is given occurring in a man aged 46, in which the glans rapidly passed into gangrene without suppuration, and another of gangrene of the scrotum (both in diabetics), quoted from Gubler.

The well known prevalence of phimosis and balano-posthitis amongst diabetic patients is noticed, and M. Fournier points out the grave risk attending circumcision. He advises strict attention to cleanliness, the use of some drying powder, and frequent injection beneath the prepuce of an alkaline lotion (bicarbonate of soda or borax). Simple balano-posthitis due to diabetes is sometimes mistaken for gonorrhœa, much to the detriment of the patient, and the liability to confound diabetic gangrene of the genitals with phagedænic chancres, etc., is well pointed out in this interesting review of what M. Fournier terms the "diabetides." — *Gaz. Méd. de Paris*, March 5 and 19, 1887.

J. HUTCHINSON, JUN. (London)

V. Treatment of Vaginal Hydrocele by Corrosive Sublimate Injections. By JAMES MILLER (London). The treatment advocated is as follows: After evacuation of the hydrocele sac, 15 min. of a solution of corrosive sublimate in water (1 gr. to the ounce) are injected and the canula withdrawn. The patient is allowed to go to his work as usual, wearing a suspensory bandage for a few days. In the four cases narrated this treatment was completely successful. In one only there was a slight pain the first night, in another some swelling for a few days, but all the patients were able to return to work at once and had no bad symptoms. The treatment seems to be as simple and as efficient as any that has been introduced.—*Lancet*, Dec. 4, 1886.

CHAS. W. CATHCART (Edinburgh).

VI. The Position and the Value of the Operation of Internal Urethrotomy. By G. BUXTON BROWNE, M.R.C.S. In speaking of the opinion of surgeons on the above subject, the author says that there are some who never perform the operation and others who view it with distrust.

This he imagines to be due to: (1). The possibility of very serious consequences after the operation in unpractised hands, etc. (2). The indiscriminate employment of internal urethrotomy by many of its advocates and their neglect of trial of simpler and safer methods of treatment.

He goes on to say that while internal urethrotomy should be the exception and not the rule, still there are certain cases where it is the only remedy, and that with certain precautions it may be made as safe as any operation in surgery. The author recommends one free division of the stricture in the floor of the urethra by means of Thompson's modification of Civiale's urethrotome; claiming that by its use we can regulate with much more precision the extent of the incision than with instruments which, working in a director, cut from before backwards.

The constant use of the bougie after the operation is indispensable. The precautions which Mr. Browne employs against urinary fever, are opiates.

The paper closes with the consideration of cases in which internal

urethrotomy is recommended. They are arranged in ten groups. In some the operation is absolutely indispensable, and in all it is the best method of treatment.

1. When time is an object.
 2. In cases of meatal or penile strictures.
 3. In cases where the gentlest interference by means of bougies is followed by rigor.
 4. For resilient strictures.
 5. Where much induration exists.
 6. In impacted calculus behind a stricture.
 7. In cases of urethral fistula associated with stricture.
 8. In the catheter life of elderly men where a stricture prevents the passage of a fair-sized instrument.
 9. In the treatment of perineal abscess where stricture coexists.
- Besides incising the abscess it is important to treat the stricture at once, if the risk of a fistula is to be avoided. Gradual dilatation is here of no avail.—*Brit. Med. Jour.*, April 16, 1887.

VII. Rupture of the Spongy Urethra; Suture. Mr. WRIGHT (Manchester). A man, æt. 54, was struck in the scrotum by a shaft prop. This was followed by swelling and inability to micturate.

Under an anæsthetic it was found that a catheter passed into a large cavity, but not into the bladder. A wound was discovered in the scrotum through which the catheter could be protruded. A little dissection showed that the urethra was torn completely across and that the ends of the canal were separated for a distance of from an inch to an inch and a half. These ends were brought together by four cat-gut sutures and a No. 10 silver catheter retained. The wound was left open. After the first fortnight the urine passed entirely through the urethra. Mr. Wright remarks: Complete rupture of the spongy urethra is of rare occurrence, and, so far as I know, primary suture has not been employed for it hitherto; it however seems to be the most rational treatment for such an accident, and in this case has had the best results. Had this not been done it is probable that the wide separation between the ends of the urethra would have necessarily left the

man with a permanent perineal fistula. For rupture of the membranous urethra, suture has already commended itself as a proper line of practice.—*Lancet*, April 30, 1887.

VIII. Three Cases of Stone in Boys; Removal by Suprapubic Cystotomy. By T. WALKER (Wakefield). CASE I.—Æt. 3 years. Rectal bag used; bladder distended with a warm solution of boracic acid. Uric acid calculus of eighty-nine grains removed. Bladder and abdominal walls sutured. No catheter nor drain employed. On the 5th day extravasation into tissues and scrotum took place. Convalescence on the 22d day.

CASE II.—Æt. 8 years. A rough stone of 50 grs. removed. No sutures to bladder, and only upper part of abdominal wound closed. No catheter nor drain employed. Rigor, 24 hours after operation. Abdomen tympanitic and tender. Fomentations and opium. Patient was discharged well in five weeks.

CASE III.—Æt. 4 years. A calculus weighing 20 grs. removed. Bladder wound closed carefully with fine catgut. Linea alba sutured with stout gut, and lastly the skin, only a small opening being left at lower part. No mention is made of catheter nor drainage tube. All urine passed through urethra. The wound healed quickly and without any complications.—*Lancet*, April 30, 1887.

XI. Rupture of Bladder. Operation. Death From Perinæal Hæmorrhage. Mr. T. PRIDGIN TEALE (Leeds). A man, æt. 25, was kicked in abdomen and perineum during a quarrel, and when seen complained of pain and inability to pass water. On the following day Mr. Teale observing a tympanitic abdomen with dulness of the flanks and hearing that the more recent catheterization had only drawn off an ounce or so of urine, operated for ruptured bladder.

He first did a perineal section and inserted an India-rubber drainage tube; then he performed abdominal section. A rent one inch in length was found not far from the apex on the posterior surface which was closed by 6 fine catgut sutures.

There was more oozing of blood from the perineal wound than

usual, which was accordingly plugged. Some hours afterwards fresh oozing occurred.

Becoming rapidly anæmic, the patient died on the following morning.

Mr. Teale remarks that the hæmorrhage might have been possibly due to the damage done to the perineum by the kick. If he were called to operate again in a similar case he would not think it necessary to insert the perineal tube, having regard to the experience of others.—*Lancet*, June 4, 1887.

F. SWINFORD EDWARDS (London).

ULCERS, ABSCESSSES, TUMORS.

I. Treatment of Hæmorrhoids by the Forcible Dilatation of the Anus. By Professor TRÉLAT (Paris). The only surgical means employed by M. Trélat for the cure of hæmorrhoids are dilatation of the sphincter and cauterization, the latter only in exceptional cases. He uses a bivalve speculum, especially made for him out of solid steel, with valves 11 centimetres 5 in length and set at right angles to the handles. This instrument can dilate the anus to such an extent that four fingers placed side by side can be introduced into it. It is very important for the patient to be thoroughly under the influence of an anæsthetic so that the anus can be steadily and gradually dilated without any risk of tearing the mucous membrane. It generally takes 3 or 4 minutes to get the speculum wide open; it is then closed and turned around so as to dilate the anus in another direction. This manœuvre is repeated two or three times in the various diameters of the anus, and when the anal ring has been thoroughly softened all round, the instrument is withdrawn and the operation is over. Occasionally, there is some insignificant loss of blood which is only to be dreaded if the patient has got into a serious state of anæmia. Here it is that recourse should be had to the thermo-cautery. Very little pain follows and all the dressing needed is a pad which is applied for the first 48 hours. Much is to be said in favor of the simplicity of the operation, but more in favour of the rapid disappearance of all the painful symptoms. The constant contractions of the sphinc

ter being stopped, there is no longer any tenesmus, nor any congestion of the piles themselves; and thus the hæmorrhages cease. So we see that the remedy does not assault the primary disease, but one of its consequences, the contracture of the sphincter. It is an indirect method. M. Trélat in his lecture reports 3 very good cases where there were large masses of internal piles and where the hæmorrhages had been so severe and frequent that the patients were in a most alarming state of anæmia. The patients who had all seemed at death's door had all their bad symptoms arrested at once and began to recover their health after one thorough dilatation of the anal sphincter.—*Le Progrès Médical*, May 14, 1887.

LEONARD MARK (London).

II. Some of the Rarer Forms of Rectal Fistulæ. By Mr. EDWARDS (London). When a sinus runs upwards from the internal opening of a complete fistula the author holds that it should be slit up if submucous, but left alone if running beneath the muscular fibres. The internal orifice of a fistula, he thinks, is directly above the external, if the latter is in front of a transverse plane running through the centre of the anus; while if the external opening be anywhere behind this plane its inner opening will be in the middle line dorsally. "Horse-shoe fistulæ," *i. e.*, those bearing one or two external orifices on either side of the anus and an internal one in the middle line behind are to be treated as follows: "Complete division of the sphincter in the middle line dorsally, laying open the abscess cavity and internal opening, and the subsequent slitting up of each lateral sinus from the external orifice to the central dorsal incision," thus dividing the sphincter only once and at right angles to its fibres and slitting up all the sinuses. Some rarer forms of fistula were mentioned. — *Lancet*, May 28, 1887.

CHARLES W. CATHCART (London).

III. Vascular Tumors of the Umbilicus. By DR. COLOMBE (Lisieux, France). In this case a small purplish or violet growth was noticed at the age of twenty-six, the patient being a domestic servant. After existing eight years without causing any trouble it bled freely, the hæmorrhage ceasing on the application of perchloride of iron. Two years later Dr. Colombe was called to the patient on ac-

count of another attack of very severe hæmorrhage (which was compared to that from a wounded femoral artery). Ligature *en masse* of the growth stopped the bleeding, though a few days later it recurred in a slight degree. The nature of the tumor was doubtful. Dr. Colombe believed that the "accessory portal venules" at the umbilicus were dilated. There were no signs of hepatic obstruction or other cause for the bleeding.

M. Blum, in the *Archives de Médecine*, August, 1876, reported cases of vascular umbilical tumors, but they were all congenital, and in this case the patient was positive the growth had only developed in adult life.—*Gaz. Med. de Paris*, 1887, May 21.

J. HUTCHINSON JR., (London).

BONES, JOINTS, ORTHOPÆDIC.

I. On Artificially Increasing the Growth of Bone. By Prof. HELFERICH (Greifswald). This is advocacy of the principle of hyperæmia at the respective point in such cases as retarded and insufficient callus-formation after fractures, and necrosis with faulty regrowth on consequent spontaneous fracture.

An elastic rubber tube is passed around the limb centrally from the affected spot and tied tight enough to cause a limited compression and a slight venous congestion of the member. The patient can readily untie it when painful. Then the limb is continuously bandaged down and up from the diseased part to localize the hyperæmia. Plaster or splint dressings can be used at the same time. Numerous cases the last six years treated in this way have convinced him of its utility. The correctness of the principle is substantiated by experimental and other pathological experience. It must always be remembered, however, that this procedure can only cause an increase of bony growth never primary development.

Physiological as well as pathological osseous growth may also be increased by hyperæmia. A young growing bone may under this influence become thicker and longer. This fact he has utilized to remedy shortening from fracture or from infantile palsy, as also on the well side in one case of morbid elongation of the tibia in a 15-year-old

girl. The compression is at first applied for hours; soon, as a rule, both day and night. Patients readily learn to get along with it. It is contraindicated in tubercular bone-affections, after operations for malignant tumors, and where, *e. g.*, fractures are complicated by large granulating wounds. As stated by H. and in the discussion, a similar plan had been followed by Dumreicher, Nicoladoni, and Thomas (Liverpool). though H. seems to think that the double constriction—above and below—is original.—Rept. of XVI Germ. Surg. Cong. in *Centbl. f. Chirg.*, 1887, No. 25.

II. A Case of Cystic Degeneration of the Skeleton. By Dr. BRAMANN (Berlin). This condition was found in a woman of 34 years, who during her fourth pregnancy had suffered from severe pain in the sacrum and lower extremities. Half a year after premature delivery a spontaneous fracture of the right femur occurred. Later both femurs and tibiæ became painfully swollen, the former fracturing spontaneously. Then both arms and one forearm became affected in the same way. On admission the evidences of a typical advanced osteomalacia were present. The autopsy showed great softening of the bones, with atrophy of the cortex in the tubular ones and dilatation of the marrow cavities with numerous pea- to walnut-sized cysts. The latter were covered at some points by only a thin cortical layer, and had evidently occasioned the fractures.—XVI Germ. Surg. Cong. in *Centbl. f. Chirg.*, 1887, No. 25, Sept.

WM. BROWNING (Brooklyn).

III. Congenital Absence of Patella. M. PAUL REDARD. In an otherwise normal and healthy child, aged 20 months, no trace of the patella on the right side could be detected, the somewhat atrophic quadriceps being continued as a fibrous band into the tuberosity of the tibia. There was slight genu valgum and flat foot on this side, and though the knee appeared to be well developed but for the absence of the patella, flexion was much limited. The child's walk resembled that of a patient with a fractured patella, and a suitable support to the knee greatly improved the condition of things. Friedleben (*Jahresbericht f. Kinderheilkunde*, 1860) reported a case of sym-

metrical absence of the patella, but the femora were also undeveloped and several other osseous malformations existed. M. Bousquet (Soc. de Chirurgie, 1815) recorded extreme atrophy of the patella in a man aged twenty-one. Movements of the joint were hardly affected.—*Gaz. Med. de Paris*, Feb. 5 and 12, 1887.

J. HUTCHINSON JR. (London).

IV. The Influence of Resections of Tuberculous Joints in Producing Diffused Tuberculosis. By THEODORE WARTMANN. An elaborate statistical paper. The cases are those operated on in the clinic of Feurer. They include cases of shoulder, elbow, wrist, hip, knee and ankle-joint—seventy-four cases in all, in subjects from children, to over 50 years of age. The points of moment directly bearing on the theme are that among 11 deaths from various causes in the above statistics one elbow resection died of old tuberculosis. Two of the wrist died subsequent to operation of old tuberculosis. In the hip cases 5 deaths, three of which were chronic tuberculosis. In only one case was acute miliary tuberculosis the cause of death. In one case of resection at the ankle there was a return of the disease after two months, and patient died, autopsy giving basilar meningitis (tubercular).

The author has followed the mode of classification of König in Göttingen. The latter divides his cases into (*a*) those who die immediately or within a short time after operation of general miliary tuberculosis. (*b*). Those where a return of the disease with suppurating processes ends in death of patient from general tuberculosis.

Wartmann, as result of his statistic, has among 74 cases of resection with 11 deaths one death belonging to each of these classes.

König, among thousands of cases, has observed 16 cases of inoculation tuberculosis (Impf tuberculosis) following operation for tuberculous disease of the bones. In all of the above cases those have been excluded which show on autopsy *chronic tuberculosis only*.

The author has then put himself to the great labor of searching the literature on the subject with the following general results:

Albrecht, 162 cases of resection joints with 75 deaths. Of these one case (wrist) died 6 months after operation with basilar meningitis.

One (ankle-joint) 1 year after operation died of general miliary tuberculosis. One (knee) died with miliary tuberculosis. One (knee) died 2 months after operation of general tuberculosis. Of the hip-joint cases 8 deaths came under the head of inoculation tuberculosis following operation.

Isaak records 1 case among 171 cases of resection.

Vetsch among 27 cases records 1 where death probably was due to inoculation.

Willemer in 63 cases of resection of all joints records 30 deaths. Five of these probably died of general acute tuberculosis following operation.

In one case of Willemer the acetabulum was found perforated, post-mortem. This condition is particularly favorable to the causation of an acute general tuberculosis. The author has in the Danish, French and English literature collected 144 cases, of which two died after operation of acute miliary tuberculosis.

Mensing, among 92 cases of knee resection, records 10 deaths, of which one resulted 14 days after operation of acute miliary tuberculosis.

Grosch collates 166 cases (wrist-joint) of which 120 are available as statistics. Forty-four of these died. Three deaths resulted from acute miliary tuberculosis.

Hirsch (wrist) records among 17 resections one death of acute tuberculosis.

Münch (foot and ankle) records 45 resections and 44 primary amputations (pre-antiseptic days, 1862-76) with five deaths. Two of these died of tuberculosis (one cerebral, one lung and intestine).

The larger works of Fock, Eulenberg, Lücke, Billroth, Leisrink, Ipsen, Hoffa have been unavailable for this statistic. French authors like Ollier, Boeckel, Verneuil only discuss the subject in a general way.

Complete English data have not been accessible to the author.

As a grand result, 837 cases of resection were collected with 225 recorded deaths. Of these deaths 26 followed the operation closely and were the result of acute general tuberculosis, probably induced by the operation. It would be interesting in the future to collate the

cases treated conservatively, and to note also the effects of antiseptic methods as a prophylactic against the outbreak of general tuberculosis.

In the above deaths it would be reasonable to suppose that a tuberculous focus opened during the operation gave abundant opportunity for the introduction of tubercle bacilli into the vessels and general circulation. In the second class of König's cases the supposition is that an eroded vessel, vein or lymph sac would afford the avenue for general infection. In all cases it must be remembered that extravasations of blood left behind after operation favor the enormous increase of numbers of bacilli. There are present all the conditions for their prolific increase and activity.

So far experimental researches on animals have not exactly duplicated the phenomena to be found in the human subject.—*Deutsch. Zeitschr. f. Chir.*, Bd. XXIV, Heft 5 and 6.

HENRY KOPLIK, (New York).

V. Genu-Valgum and Osteoclasia. E. KIRMISSON and O. LANNELONGUE (Paris). A specimen was shown at the Société de Chirurgie, interesting on account of the light it threw upon the anatomy of genu valgum. It was the knee-joint of a child on whom osteoclasia had been performed with Robin's apparatus. The child was in the hospital for three months, and went out with a perfectly straight limb, but the deviation reappeared almost immediately.

The autopsy showed that in this case the principal thing to deal with was the bent condition of the lower extremity of the femur, which has been pointed out by Macewen, and that there was very little hypertrophy of the inner condyle.

M. Lannelongue knew of several cases which confirm this, and had found that the deformity so often reappeared in children six months after the performance of osteoclasia that he had quite given up the operation.—*Le Bull. Med.*, July 31, 1882.

LEONARD MARK (London).

WOUNDS.

I. Drainage and Primary Union. By M. CHENIEUX (Limoges). With drainage primary union cannot be obtained in the entire extent of the wound. The drain, whatever its nature or volume, always occupies a place where apposition cannot be effected. If it is large it prevents union in a proportional extent. In all cases the drain excites the wound and provokes a more or less abundant exudation. It is a relic of carbolic acid antiseptics, under which liquid was effused in abundance, and without drainage, detachment would have occurred. But now that we have corrosive sublimate, iodoform, biniodide of mercury, endowed with great antiseptic power, it is legitimate to simplify the dressing and seek for entire primary union by the suppression of drainage. For four years the author has dispensed with drainage in cases where he wished to obtain perfect union, with good success. In ablation of more or less extensive tumors he has always obtained perfect union. In a case of thyroidectomy, notwithstanding the vast extent of the wound and seven or eight ligatures, it had united without drainage. The union was perfect everywhere except at the level of the suprasternal depression, where the skin could not be brought into apposition, and even in that point there was no suppuration, and the cure was complete on the 18th day. In a case of abdominal hysterectomy, when the whole supravaginal portion of the uterus was removed with the broad ligaments and the ovaries, detaching extensive adhesions leaving vast bleeding surfaces, he abstained from drainage with good results. The patient got up on the 27th day. It is best to return the pedicle, to appose and unite the edges and not to be concerned with the fluids which have gravitated into the true pelvis. These fluids, composed of serum and blood, thanks to the use of sublimate, are perfectly aseptic and not irritant. They are in closed cavities in which they find the same conditions as exist in the space between the two ends of a divided muscle or tendon after myotomy or tenotomy. With drainage, on the contrary, these fluids become a vehicle for microbes. Aseptic fluids are easily and harmlessly absorbed. He concludes:

1. Drainage is an enemy to primary union of wounds

2. All wounds whose edges have been perfectly apposed and rendered aseptic should present primary union.

3. In all operations, such as ovariectomy and hysterectomy, where ligatures must be hidden and where large bleeding surfaces exist, drainage seems to be harmful rather than useful.

4. Exuded fluids seem to him to constitute reserve fluids and to be reabsorbed into the system. They are lost in case of drainage and become poisoned by microbes.—*French Congress of Surgery, Revue de Chirurgie.*, Nov., 1886.

JAMES E. PILCHER (U. S. Army).

REVIEWS OF BOOKS.

THE RECTUM AND ANUS: THEIR DISEASES AND TREATMENT. By CHARLES B. BALL, M. Ch. Univ. Dub., etc., Surgeon to Sir Patrick Dun's Hospital, etc.; (54 illustrations and 4 colored plates). Cassell & Company, London, New York, etc., 1887. 8vo, pp. 416.

A PRACTICAL TREATISE ON THE DISEASES OF THE RECTUM. By ALFRED COOPER, F.R.C.S., Surgeon to St. Mark's Hospital for Fistula and Other Diseases of the Rectum, etc.; London: H. K. Lewis, 1887. 8vo, pp. 192.

Remembering the number of volumes that have already appeared on the subject of the two above named works, the reader is not unlikely to ask: "Are new ones really wanted?" Dr. Ball anticipates this question in his preface and replies that the improvements in wound treatment within the past few years have produced important changes, not only in the practice of surgery generally, but also in the surgery of the rectum.

Mr. Alfred Cooper makes no apology. Nor will any apology be deemed necessary from the author of either of these books by anyone who looks carefully into them. There appear, from time to time, in every department of surgery, essays and treatises by persons without experience of their own and also without the industry to gather and collate the experience of others. These productions are received in different ways by different sections of the profession. First, there are the men, usually very few, who regard themselves as the rivals of the new author, and every guinea which he may get as so many shillings out of their own pocket. Great and fierce is often the indignation of these. Secondly, there are the author's personal friends in another line of practice. They exhibit remarkable tolerance and charity. The third class is constituted by the professional critics. Ah, if authors knew how the majority of these longed to cry "Havoc," and what "dogs of war" they are when let loose from editorial restraint! But now-a-days such liberty is seldom allowed. A snarl or a growl, and—pop goes the animal's nose into the waste-paper basket, smothering the unpleasant noise among empty envelopes.

Lastly, there is the great and numerically far preponderating class of persons who look at, or borrow, or accept the free gift of, or who occasionally even buy, special treatises. Which of the above courses they take is of no consequence. If, by any means, "Brown on the Eves," or "Jones on the Rectum" can find a niche beside "Pears' soap," where memory holds her seat, Mr. Brown and Mr. Jones are content.

From such our journal endeavors to keep aloof. Returning to Dr. Ball and Mr. Cooper, the former has produced a treatise which stamps him as a surgeon of talent and experience and as an author unsparing of pains. The latter is well known as a specialist in rectal surgery of very long and varied experience, and as one of the most successful men in the profession in London. If, therefore, Mr. Cooper needed any justification for writing his book it would be found in the natural curiosity of men to know what the experienced and successful have to tell concerning their principles and practice. He has, moreover, earned a right to be heard by twenty years of silence.

The difference between the two books may be seen by comparing almost any two chapters dealing, each, with the same subject. Mr. Cooper gives a plain unvarnished narrative of what he has seen of the given diseases and of what he is in the habit of doing for its cure.

He refers incidentally to the teaching or practice of others, and generally with fairness and freedom from prejudice. In short, the 14 chapters of the book resemble a series of clinical lectures without illustrative cases, if such be possible. And although the cases are not reported, they seem to the reader to be in the background, as it were, for the little book is pervaded throughout by a practical tone.

A corresponding chapter by Dr. Ball is a kind of concentrated monograph. It surveys the teaching, and marshals the recorded observations of leading authorities, living and dead, British, American and foreign. In doing this Dr. Ball shows very great ability. It would be difficult to surpass some of these chapters, *e. g.*, that on excision for cancer, either in clearness, brevity, sound judgment, or in a certain quietude and ease of style.

CHARLES B. KEETLEY (London).

HIP DISEASE IN CHILDHOOD, WITH SPECIAL REFERENCE TO ITS TREATMENT BY EXCISION. By G. A. WRIGHT, B.A., M.B. Oxon., Assistant Surgeon, Manchester Royal Infirmary, Surgeon to the General Hospital for Children, Manchester and Pendlebury, Lecturer in Clinical Surgery in the Owen's College. 8vo. Illustrated., pp. 246; London: Longmans.

This work may be divided into two parts, namely: (1). A brief résumé of the works which have been written and the opinions which have been expressed within the last hundred years upon hip disease joint; and (2) the author's own experience of the same affection.

In this notice it will be sufficient to deal with the latter.

At the time of sending this book to press Mr. Wright had excised the hip one hundred times. It is important to know the opinion of a surgeon at such a stage of his experience. The following are Mr. Wright's own words: "I should expect, among 100 cases excised at the time I recommend to lose or have to amputate about 15, to have about 10 unsatisfactory or useless limbs and 75 useful limbs, with or without sinuses, and with shortening varying from one to three inches."

The time recommended by Mr. Wright for excision is the time of the appearance of signs of pus outside the joint or of evidence of its existence within it. He agrees, however, with Mr. Holmes that a distinction is to be made in this respect between ordinary hospital cases and the cases sometimes met with in private practice, believing that in children of the well-to-do the period of non-intervention in a case of hip disease may be prolonged with good ground for hoping that the pus may, in time, become absorbed.

The line of excision selected by Mr. Wright is one over the trochanter in the middle line of that prominence and slightly concave forward. He prefers to remove the trochanter rather than to let it remain, even when that process is perfectly sound, believing that its presence would interfere with the perfect coaptation of the resected parts, and he draws marked attention to the danger of fracture in thrusting, for the purpose of removal, the head of the femur, out of the wound, preferring to divide *in situ* the neck of the bone. The extending apparatus he adjusts before the operation and he commences extension directly after it. He uses Bryant's splint almost invariably while the patient keeps his bed and Thomas' splint when he is able to get about.

There are short chapters upon the less common affections of the hip, such as syphilitic disease, congenital dislocation and hysterical affections, and the work concludes with an excellent summary of the hundred cases of excision, all of them interesting, which have fallen to the lot of the author. In the dogmatic part of this work there is not much that is original. The experience, however, which Mr. Wright has gained, and which he has been good enough to make public will be of great use to others, and his book will rank as an authority, concise and clear, upon the subject with which it deals.

S. D. CLIPPINGDALE.

TRAITÉ DES MÉTHODES TECHNIQUES DE L'ANATOMIE MICROSCOPIQUE, HISTOLOGIE, EMBRYOLOGIE AND ZOOLOGIE. Par MM. ARTHUR BOLLES LEE, F. HENNEQUY, Préparateur des Cours d'Embryologie au Collège de France. Paris, 1887; New York: G. E. Stechert. Pp. 488.

TREATISE ON THE TECHNICAL METHODS OF MICROSCOPICAL ANATOMY, HISTOLOGICAL, EMBRYOLOGICAL AND ZOOLOGICAL. By ARTHUR BOLLES LEE and F. HENNEQUY.

The above treatise will prove a very acceptable one to the practical worker in the laboratory. It will be perhaps very useful to those interested in special subjects. It covers very completely the whole field of microscopical manipulation. Many things will perhaps seem to be of doubtful application, yet by actual study of the work we are certain that all the methods recommended had been tried by the authors. The different methods of staining, section cutting, hardening are accompanied by foot notes as to utility and references to the literature. Of especial note are the excellent chapters on staining, also section cutting and methods of embedding. The chapter on the nervous system will be found a very complete one, containing the later methods (Weigert) of preparation, both in staining and modes of hardening.

The aniline dyes are also treated in one of the chapters. The accumulating literature on microscopical preparation of tissues makes a work of this kind almost a necessity, and we think the authors have well succeeded in formulating and presenting the mass of material worthy of trial up to the present day.

The work is introduced with a preface by Prof. Ranvier. It has also complete indexes of authors and subjects. HENRY KOPLIK.

DIE QUEREXCISION DER FUSSWURZEL-KNOCHEN. Von DR. J. SCHMIDT [Cologne.] Mittheilungen aus dem Kölner Bürgerhospital von Prof. Dr. Bardenheuer. Köln und Leipzig: Albert Ahn, 1886. New York: G. E. Stechert.

TRANSVERSE EXCISION OF THE TARSAL BONES. By DR. J. SCHMIDT.

Believing that caries of the foot most frequently originates in, or affects the five small bones at the root of the foot, the author favors Prof. Bardenheuer's method of extirpating all these bones in all cases of caries of the tarsus.

He makes a transverse incision over the back of the foot, from the

base of the first to that of the fifth metatarsal bone, or higher up, according to circumstances. The incision is always, however, transverse. The tendons of the common long and short extensor muscles of the toes; of the external interossei muscles and, sometimes, that of the abductor digiti minimi are cut through together with the smaller vessels and nerves. The entire flap having then been dissected up, parallel cuts are made through the entire bony portion of the foot, with a saw, and at right angles to its axis, and thus a slice is taken out of the middle of the foot containing more or less of the root of the foot and including all the diseased portions. The incisions are directed through the substance of the bone in preference to the joints, which are avoided. After operation the front part of the foot is connected with the posterior portion only by the plantar soft tissues. The two portions are now approximated, and the skin sutured, or else, and preferably, tamponade with dry antiseptic gauze is done, and approximation is not made till granulation has set in, secondary suture of the skin being then made after freshening up of the edges.

The author publishes 17 cases, one of his own, performed at the "Bürgerhospital," or "Augustinerinnenkloster" at Cologne.

Recovery generally occurred without reaction. The anterior portion of the foot could be moved in two or three weeks, and the toes could be extended. In one month recovery was complete. The author believes a new articulation is formed between the sections of bones, as was found in one case at post-mortem examination. If desirable wire sutures would prevent this.

Occasionally, a faulty position of the foot requires putting up in plaster during the time of recovery. With the exception of three cases, where secondary resection became necessary, the operations were all successful. Three patients subsequently died from other tuberculous affections. Two photo-lithographs illustrate the method and cases.

LEHRBUCH DER PATHOLOG. ANATOMIE VON DR. F. V. BIRCH-HIRSCHFELD. 3te völlig umgearbeitete Auflage. I Band, und II Band, erste Hölft. Leipzig: F. C. W. Vogel, 1886, 1887. New York: G. E. Stechert.

MANUAL OF PATHOLOGICAL ANATOMY. By DR. F. V. BIRCH-HIRSCHFELD.

LEHRBUCH DER ALLGEMEINEN UND SPECIELLEN PATHOLOGISCHEN ANATOMIE. VON DR. ERNST ZIEGLER. 5te Auflage. I Band. Jena: Gustav Fischer, 1887. New York: G. E. Stechert.

MANUAL OF GENERAL AND SPECIAL PATHOLOGICAL ANATOMY. By
DR. ERNST ZIEGLER.

Within the last year new editions of the above named works on pathological anatomy have been made necessary by the rapid advances of science.

Indeed, it is not until one sees the clinical and experimental work recently published in the form of monographs, collected together and their influence upon the old teachings acknowledged, that one realizes to what extent scientific research has advanced.

The above named works are so well known and have earned so wide a reputation that any comment on their scientific character is unnecessary. It suffices to mention that all newly-acquired knowledge in pathology has been duly considered in the text. And when one remarks that such subjects as bacteriology and karyokinesis have been accorded separate sections in the books, it becomes evident that the subject matter of other chapters has had largely to be rewritten, in order to attain uniformity. And so marked is the influence of the new teachings upon all subjects of special surgical interest, that these volumes command a place in every complete surgical library.

Both works are abundantly illustrated, both with colored wood-cuts and chromo-lithographs.

The chapters on microscopical technique and bacteriology in Birch-Hirschfeld's work have been written by the late Dr. Karl Huber, of Leipsic, and by Dr. Arno Becker, formerly of Koch's laboratory, Berlin. The department on veterinary pathology is contributed by Prof. A. Johne, of Dresden.

DIE MECHANISCHE BEHANDLUNG DER LUMBAGO. Von DR. J. SCHREIBER. (Aussee-Meran). Wiener Klinik, March, 1887. New York: G. E. Stechert.

MECHANICAL TREATMENT OF LUMBAGO. By DR. J. SCHREIBER.

A pamphlet of 43 pages, devoted principally to the description of the author's method of applying massage in both recent and chronic cases of lumbago. Cases are also given. The author's experience leads him to believe that mechanical treatment is capable of curing every case of lumbago, whether recent or of long standing. Rest and antiphlogistic measures increase the pain and functional impairment.

Proper gymnastic apparatus are necessary to facilitate the treatment

and hasten recovery. Recurrences, although always liable to occur, may be held in check by prompt action on the part of the patient.

The methods used by the author consist in passive manipulations and in active exercise with and without specially constructed apparatus—each calculated to attack all the muscles affected in turn.

DIE LOCALE ANÆSTHESIE BEI ZAHNEXTRACTIONEN. Von GEORG VIAN, Paris. Uebersetzt von B. MANASSEWITSCH. Berlin. Hirschwald, Aug. 1887. New York: G. E. Stechert.

LOCAL ANÆSTHESIA FOR EXTRACTION OF TEETH. By GEORGE VIAN, Paris. Translated by B. MANASSEWITSCH.

This little pamphlet contains the report of 86 cases of extraction of one or more teeth or roots during local anæsthesia, produced by subgingival injections. In no case was any pain felt, nor were any ill effects subsequently noticed.

The author's discovery consists in using a carbolized solution of cocaine. He dissolves 0.05 gm. muriate of cocaine in 0.6 gm. of a two-percent. carbolic solution freshly each time, and injects half on either side of the tooth into the gum, at a point situated between the neck and the tip of the root of the tooth. After three minutes complete anæsthesia results and the extraction can be made after five minutes.

He also experimented with pure carbolic solution and obtained good results by injection of 50 centigrammes of a two-percent. solution on each side of the tooth.

W. W. VAN ARSDALE.

LAPAROTOMY FOR ACUTE INTESTINAL
OBSTRUCTION, WITH ABSTRACTS OF
69 CASES, INCLUDING A SUCCESS-
FUL ONE BY THE WRITER.¹

BY FRANK W. ROCKWELL, M. D.,

OF BROOKLYN.

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THE relief of intestinal obstruction by operative measures has for centuries formed a prolific topic for professional discussion, and the procedure known to-day as laparotomy, was like enterotomy, suture of the intestines, rectal inflation and the use of emetics in these conditions, known to the Greeks, but probably rarely practiced, until brought into prominence by Dupuytren, Malgaigne and Depaul, in France, and then slowly adopted in England and other countries. The first recorded success by an English surgeon, I believe, is that of Mr. Jonathan Hutchinson, recorded in the *Med. Chir. Trans.*, so lately as 1874.

Four years later, however, at a meeting of the Medical Association at Bath, we find this surgeon strongly discountenancing early exploratory operation, and urging in its place, inversion of the patient, copious rectal enemata, and abdominal taxis, while he suggests that "in cases of uncertain diagnosis, it is better to trust to the chance of a spontaneous cure or relief by repeated abdominal taxis, than to resort to exploratory operation;" "or in desperate cases, iliac enterotomy should be done." A critic of this paper, also an advocate of non-inter-

¹Read before the Brooklyn Pathological Society, Dec. 23, 1887.

ference,¹ says: "If this treatment failed to kill the patient it would, at any rate, should the case be doubtful, so increase the severity of the symptoms, as to place the diagnosis beyond doubt. If practiced in peritonitis or enteritis, a fatal issue might be expected. This memorandum is a terse example of that line of treatment I have characterized as the main force treatment. Mr. Hutchinson adds 'if you do not succeed at first, do it repeatedly.' How often, I should like to know, could this be done with impunity?" In the discussion which followed the reading of the above paper, prompt issue was taken with the views presented, and with its termination began a new era in the history of laparotomy. The application of antiseptic principles to abdominal surgery, and the lessons in technique to be derived from ovariologists, also tended to inspire confidence in the mechanical treatment of intestinal occlusions, and it is for these reasons that I have limited my investigations to the operations performed in the last ten years. The list is by no means complete, but contains most recorded operations for *acute obstruction* in Great Britain, France and this country, while those which I have not been able to verify by reference to authorities in Germany, Italy and Russia, I am confident will give as good or even better results than those presented this evening.

The criticism that many unsuccessful operations remain unreported is, of course, valid, but the balance can be easily struck without weakening the conclusions drawn, I think, by the statement of the fact that the Register General of England officially reports that an average based on statistics extending over 25 years, shows an annual death rate in England and Wales of 1434 from intestinal obstructions. It has been my object in the preparation of this paper to simply draw from the cases, occurring in the time mentioned, some general inferences as to what the duty of a surgeon called to treat these cases might be, and to see whether practice, founded on the theory of early exploratory interference, stood the test of experience. According to estimates by Schramm of Krakow

¹The Past and Present Treatment of Intestinal Obstructions.—Hugh Owen Thomas, London, 1879, p. 150.

(assistant to Miculicz),¹ based upon 190 cases, the percentage of deaths was 64.2. Previous to 1873, 73 per cent of all cases operated on died, while the best German statistics give about 58 per cent, showing a gain of 15 per cent for modern methods.

Surely in the light of this statement, it would seem as if no argument were necessary for early relief in cases otherwise so often fatal. Still, it has been my unfortunate experience to see several cases in which either the condition of the patient at the time of consultation, or the lukewarm manner in which operation was presented to the family by the medical man in attendance, negated all possibility of relief, and in one case at least an autopsy demonstrated the ease with which aid could have been given.

ACUTE OBSTRUCTION—DEATH.

CASE I.—A young man of 25 had a severe attack of colicky pain while at a social gathering; he was taken home and suffered during that night and the following day. Toward evening his physician saw him and prescribed for simple gastralgia. By noon of the third day vomiting, which had begun on the previous morning, was decidedly fecal, and his physician suggested a laparotomy. An enema and warm bath, however, quieted all the symptoms so quickly that his fears were allayed. On the evening of the following day, however, the pain again became severe, and I saw the case. The fact that absolute constipation had now existed for five days, that the patient had suffered from peritonitis a year previously, taken in connection with the fecal vomiting, and the presence of a distended coil of intestine in his right iliac region, made me diagnosticate strangulation by band, and this in spite of the fact that his temperature was normal, and there was little tympanites. His pulse was 120, of fair quality, and his urinary secretion normal. Operation was urged and refused. The patient died on the eighth day of the attack. At the autopsy a coil of intestine protruded through the incision as soon as made, and proved to be the strangulated loop. Two adjacent coils of ileum were united by an adhesion, under which the loop had passed and become incarcerated. On cutting this across, gas passed freely into the collapsed bowel. No other

¹*Archiv. fuer klinische Chirurg*, Bd. 30.

bands : little or no peritonitis except near affected coils, and only 3iv of sero-pus in the abdominal cavity.

Can any one doubt that five days earlier, on the first appearance of feculent vomiting, this case could have been saved by a perfectly simple and rapid operation?

My first case in which laparotomy was accepted when proposed was the following :

ACUTE OBSTRUCTION FROM VOLVULUS.—LAPAROTOMY.—DEATH.

CASE II.—A man of about 45 had been suffering from absolute constipation for five days, when I first saw him. There had been no particular pain, and but little vomiting or rise of temperature. The pulse had averaged 80, and but little tympanites existed. Large enemata and laxatives had been given, and for the two days previous to operation, opium for peritonitis, the symptoms of which were becoming marked. On opening the abdomen a distended coil of ileum at once protruded; it was intensely inflamed and adherent to adjacent coils by masses of flaky lymph. It was so friable as to tear easily in one place under necessary manipulation; the rent which only extended into the muscular coat, was closed with two Lembert's sutures of silk. On tracing the coil downward a volvulus in the neighborhood of the ileo-cæcal valve was found, and although the intestine was twisted twice about its own axis, and firm adhesions existed, it was finally unravelled, and gas at once made its way into the gut below the seat of strangulation. A pint of stinking sero-pus was removed from the cavity, which was then irrigated with warm carbolized fluid ($\frac{1}{60}$) the peritoneal toilette made and the wound closed, a continuous catgut suture being applied to the peritoneal edges, and one of interrupted silk to the muscular flaps. The patient rallied well, but only survived one day, dying with symptoms of collapse. No autopsy could be obtained.

This case well illustrates not only the dangers of delay but the insuperable obstacles to a correct diagnosis which surround many of these cases, as here was a man suffering from a disease incurable by any but mechanical means, and yet presenting only the symptoms of a mild peritonitis. It would seem to be a marked exception to the rule laid down by Treves, that where the obstruction is complete, the pain is marked and con-

stant. One other observation of this author I have, however, found preeminently true, and that is, that nothing is more unreliable in the matter of diagnosis than the attempt to define the seat of the obstruction by the location of the pain.

Wherever and whatever the trouble may be, the umbilicus or its vicinity is the usual site referred to by the patient. Vomiting, too, which almost always accompanies the first onset of the symptoms, and is due largely to shock, may, as in the above case, be so slight as to attract but little attention, though as a rule, there is a very direct relation between its character and severity, and the completeness of the occlusion.

Any attempt, therefore, in a paper of this character to examine into the pathognomonic symptoms of the different kinds of acute obstruction would be foreign to the end which I have in view, which is simply the presentation of the cases referred to in my list, and of any inferences which may be fairly drawn from them. In most of these the usual symptoms of value were those attending ordinary strangulated hernias severe: abdominal pain, collapse, vomiting, constipation and more or less abdominal distention. In many of the fatal cases these symptoms, urgent from the first, and aggravated by the injudicious use of enemata, purgatives, abdominal taxis and delay, or masked by opium, rendered even properly performed operative measures futile, while on the other hand patients apparently moribund have been saved.

Although a few cases of foreign body have been admitted to the list, I think their use legitimate, as they were practically acute cases, having given rise to no symptoms which would place them under the head of chronic obstruction. As the mortality was 75 per cent., they certainly will not influence the statistics too favorably.

Obstruction from diverticula I have grouped by themselves, as I think they cannot, even roughly, or for clinical purposes, be classed among "bands," which differ from them in anatomy, pathology and method of treatment.

After dividing the cases under the head of intussusception, volvulus and band, a few cases still remain as unclassified.

TABLE OF CASES OCCURRING IN DECADE BETWEEN 1877 AND 1887 IN WHICH LAPAROTOMY WAS PERFORMED FOR ACUTE INTESTINAL OBSTRUCTION.

No.	Operator	Sex and Age.	History.	Date.	Result.	Authority.
1	Sands.	F., 6 ms	Intussusception Inflation, etc., tried. Operation 18 hours after.	March 11, 1877.	Recovered.	N. Y. Med. Jour. June, '77.
2	Creve-ling.	F., 21	Obstruction from omental adhesion. Operation on 14th day. Death in 4 hours.	Sept. 30, 1877.	Died.	Trs. State Md. Soc. of N. Y., 1879.
3	Cripps.	M., 18	Obstruction for 9 days. Fecal vomiting last 4. Ileum constricted by band.	Jan. 26, 1878.	"	Trs. London Clin. Soc., xi, 234
4	Lawson.	M., 23	Previous constipation for 6 weeks. Acute symptoms and fecal vomiting May 29. Op. on 6th day. Volvulus relieved artificial anus.	June 3, 1878.	Recovered.	Brit. Med. Jour., July, 1879, i, 83.
5	Bryant.	F., 50	Peritonitis present for 3 days previous to operation, fecal vomiting for 8 hours. Gall stone removed.	Aug. 8, 1878.	Died.	London Lancet, 1879, i, 364.
6	Bellamy.	F., 34	Invagination of ileum into anterior wall of rectum. Operation on 10th day. Reduction by right hand in rectum, and left in the abdominal cavity.	Feb. 17, 1879.	Recovered.	"
7	Nancrede	M., 29	Obstruction following kick. Gangrenous peritonitis. Operation on 4th day.	Aug. 23, 1879.	Died.	Phila. Med. Times, 1879, 75.
8	Marsh.	F., 40	Obstruction from malignant stricture of the sigmoid flexure. Op. on 8th day. Artificial anus.	Oct. 15, 1879.	Recovered.	London Lancet, 1879, i, 364.
9	Boeckel.		Occlusion by band	1880	"	Bull. et Mem. Soc. d' Chir. de Paris, '80, vi. 399.
10	Briggs.		Obstruction from intussusception.	"	"	Indiana Med. Reporter, Sept. 1880.
11	"		Obstruction from tubercular ulceration. Enterectomy and artificial anus.	"	"	"
12	"		Obstruction from pressure of an ovarian cyst. Laparotomy. Cure by drainage.	"	"	"

LAPAROTOMY FOR ACUTE INTESTINAL OBSTRUCTION.

No.	Operator.	Sex and Age.	History.	Date.	Result.	Authority.
13	Marcy.	F., 60	Obstruction from incarcerated umbilical hernia. Operation on 3d day. Patient in extremis. Gangrenous omentum and sac removed.	1881	Recovered.	Boston Med. & Surg. Jr., 1886, 79.
14	Marcy.	F., 56	Resection of omentum and gangrenous sac of umbilical hernia, after several days obstruction. Death in two and a half days.	1881	Died.	" "
15	Estil.		Intussusception.		Recovered.	Virginia Med. M'thly, '81, 7, 556.
16	Jacobi.	F. 2 mos.	Intussusception, bloody discharge from rectum, etc. Operation eighteen hours after invasion. "Gangrene imminent."	Sept. 22, 1881.	Died.	N. Y. Med. Rec., Vol. 21, 299.
17	Arnison.	M. 54	Obstruction from rupture of aneurism of hepatic artery, causing pressure at hepatic flex of colon, which also contained a gall stone. Operation on third day.	1881	"	Brit. Med. Jour., Dec., '81.
18	Bell.	F., 16	Obstruction treated by purgatives. Operation on 7th day. Intussusception, volvulus and constricting band. Death in twelve hours.	1882	"	Edinburgh Med. Jour., July, '81.
19	Hulke.	M.	Strangulation by omental bands, fecal vomiting. Operation on 3d day.	1882	"	Brit. Med. Jour., '82, 1, 14.
20	Sydney Jones.	M., 26	Obstruction by diverticulum from ileum, vomiting for nine days. Operation. Death in twenty-four hrs.	1882	"	Brit. Med. Jour., '82, 1, 540.
21	Halsted.	F., 35	Obstruction. Volvulus of sigmoid flexure and band. Operation on 10th day.	Dec. 19, '82.	"	Trans. N. Y. Surg. Soc., Dec. 26, '82.
22	Gerster.	M., 13	Obstruction following peritonitis, after 8 weeks. Vermiform appendix attached to abdominal wall. Death in eleven hrs.		"	" "
23	Barwell.	boy	Obstruction from diverticulum of ileum. Operation on sixth day. Death in thirteen hrs.	Feb. 5, '83.	"	Brit. Med. Jour., '83, 1, 255.
24	LeFort.	M., 18	Obstruction following peritonitis after 3 years. Operation on 7th day. Boy moribund. Band over ileum near cæcum.	June 1, '82.	Recovered.	N. Y. Med. Rec., Vol. 23, 205, '83.

<i>No.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>History.</i>	<i>Date.</i>	<i>Result.</i>	<i>Authority.</i>
25	Hulke.	M., 40	Volvulus. Operated on 4th day. Death on 3d day after.	Aug. 7, '82.	Died.	Brit. Med. Jr., '83, i. 144.
26	Sydney Jones	F., 43	Obstruction by band, 4 years after ovariotomy. Operation on 9th day of acute symptoms. Patient mori- bund, enterectomy and artificial anus. Death two weeks after.	June 23, '83.	"	Lancet, 1883, 818.
27	Gillette.		Int. obstruction by diverticulum. Enterectomy and artificial anus.		"	Union Medi- cale, '83, 36, 62.
28	Koehler.		Int. obstruction. Operation on 7th day.		Recovered.	Charité Ann., '83.
29	Wright.	M., 42	Symptoms for 4 weeks, followed by acute intestinal obstruction. Op- eration on 9th day. Omental band and tumor in cæcum. Artificial anus formed. Survived twelve days		Died.	London Lan- cet, '84, i. 633.
30	Stoneham.	F., 18	Obstruction, vomiting (not fecal). Operation on 4th day. General peritonitis. Volvulus.	Marc 18, '84.	Recovered.	Brit. Med. Jr., '87, 1092.
31	Blondeau.		Internal obstruction. Laparot- omy.		Died.	France Medi- cale, '84, i. 1, 77.
32	Franks.	M., 47	Intussusception at ileo-cæcal valve. Man a drunkard. Operation on 6th day. Death in two and a half days.	March 4, '84.	"	Dublin Jour. Med. Sci., '84, i, 502.
33	Homans.	M., 21	Obstruction from diverticulum. Operation on tenth day. Artificial anus. Death on 7th day after.		"	A. m. Jour. Med. Sci., '84, 56.
34	Bardleben.	M., 24	Int. obstruction from exudate. Incision and intestinal suture on 3d day after admission to hospital.	Aug. 17, '84.	Recovered.	Deutsch Med. Woch., '85, May 14
35	Obalinski.	M., adult.	Laparotomy for obstruction. Pa- tient sent home well in ten days.	Sept. 19, '84.	"	Wiener Med. Press, '85, Feb. 15.
36	Savory.	F., 53	Acute obstruction and operation on 4th day. Intestine claret color, almost gangrenous.	Jan 6, '83.	"	Brit. Med. Jour., '83, May 26.
37	Robson.	F.; 33	Obstruction and vomiting. Oper- ation on 7th day. Intussusception. Resection of gangrenous gut. Death in twenty-four hours.	Dec. 30, '84.	Died.	Brit. Med. Jour., '85, 2, 651.

No.	Operator.	Sex and Age.	History.	Date.	Result.	Authority.
38	Polailon.	M., 17	Obstruction caused by obliterated umbilical artery. Operation on 8th day.	July 23, '84.	Recovered.	Gazette Medicale, April 25, '85.
39	Kurz.	M., 33	Obstruction coinciding with hernia. Operation on 6th day. "Colon ensnared by ring."	Nov. 1, '84.	"	Deutsch. Woch'n. March 16, '85.
40	Obalinski.	M., adult.	Second operation nearly 4 mos. after first on case 35. Patient died from fecal extravasation due to typhoid ulceration, present but unsuspected at time of admission.	Jan. 6, '85.	Died.	Wiener Med. Presse, Feb. 15, '85.
41	Bardleben.	M., 47	Volvulus of ileum following obst. for several days. Operation on second day.		Recovered.	Deutsch. Med. Woch. May 14, '85.
42	Jeannel.	M., 53	Obstruction by band. Operation on 6th day.		"	Bull. Soc. de Chir., Paris, '85, 185.
43	Owen.	F., 3 days.	Congenital obstruction, artificial anus on third day. No search for obstruction. Death in 4 days. Band due to fetal peritonitis found at autopsy.	April 14 '85.	Died.	Brit. Med. Jour., '85, 1, 1201.
44	Pugh.	M., 6	Chronic constipation. Acute obstruction. Operation on 6th day. Band divided.	July 11, '85.	Recovered.	Brit. Med. Jour., '85, 2, 392.
45	Bean.	F., 48	Constipation for two months. Operation on 3d day of acute obstruct. Enterolith removed from ileo-cæcal junction.		"	N. Y. Med. Rec., '85, 2, 432.
46	Gersung.		Intestinal obstruction. Laparotomy.		"	Wien. Med. Woch., '85.
47	Gay.	M., 7½.	Acute obstruction following chronic. Operation on 13th day. Stricture at ileo-colic junction. Death 9 days after from peritonitis.	Nov. 24, '85.	Died.	Boston Med. & Surg. Jour., '86.
48	Irish.	M., 25	Ileo-cæcal invagination. Operation on 3rd day.	July 24, '85.	Recovered.	Boston Med. & Surg. Jour., Sept. 3, '85.
49	Winslow.	F., 23	Intestinal obstruct. complicated by hydrocele of round ligament. Operation on 7th day. Ileum attached for 6 inches to Douglas's pouch. Freed by tearing.	Dec. 8, '85.	"	Am. Jour. Med. Sci., '86, 1, 411.
50	Rockwell.	M., 60	Obstruction from volvulus. Operation on 5th day. General peritonitis, and suture of torn intestine. Death in 24 hrs.		Died.	N. Y. Med. Jour., Feb. 20, '86.

No.	Operator.	Age and Sex.	History.	Date.	Result.	Authority.
51	Westbrook.	M., 19	Acute obstruction from multiple adhesions. Operation on 7th day. Death in 11 hrs. Intestine gangrenous and perforated.		Died.	N. Y. Med. Jour., '86, i, 207.
52	Pilcher.	F., 29	Intest. obstruct. due to adhesions between ovary and mesentery. Operation on 11th day. Patient moribund. Transfusion (saline). Death immediately following.		"	" "
53	Roehler	M., 23	Intestinal obstruction from band. Operation on 7th day.	1886	Recovered.	Berlin Charité Annals, x, 486.
54	West.		Acute obstruction. Laparotomy. Peritonitis present.		"	N. Y. Med. Jour., '86, i, 166.
55	Lange.	F., 60	Obstruction from concretion. Operation on 4th day. Peritonitis present. Death in 11 hrs.	Sept. 19, '85.	Died.	N. Y. Surg. Soc. Trans., Dec. 22, '85.
56	Barker.		Acute intestinal obstruct. followed by general peritonitis.		Recovered.	Trans. London Clin. Soc., 86, 149.
57	Barnhill.	F., 65	Obstruction following ovariectomy. Operation 5 weeks after, adhesions divided.	Aug., '86.	"	Phil. Med. Register, '86, 2, 416.
58	Williamson.	M., 22	Acute obstruction, fecal vomiting. Operation on 14th day. Two bands divided.	Aug. 27, '86.	"	Brit. Med. Jour., '87, i, 1092.
59	Jamieson.	M., 42	Obstruction lasting 2 days. Laparotomy.	Sept. 5, '85.	"	Brit. Med. Jour., '87, i, 568.
60	Wylie.	F., 50	Obstruction from band over ileum. Operation on 3d day. Intestines chocolate color.	Oct. 9, '86.	"	Am. Obst. Jour., July, '86, 1259.
61	Wyeth.	F., 56	Obstruction from incarceration of loop of intestine in groin. Temporary operation in groin on 6th day. Laparotomy on 19th day, with resection of 2½ inches of gangrenous gut.	Oct. 9, '86, & Oct. 22, '86.	"	N. Y. Med. Jour., '87, 15, 309.
62	Bond.	22	Int. obstruction. Operation on 5th day and band of jejunum divided. Rupture of gut, artificial anus made. Enterectomy Feb. 16.	Jan. 7, '87.	"	London Lancet '87, i, 728
63	Barker.		Intussusception from neoplasm. Excision of growth, suture of cut ends of intestine.		"	Proc. of Royal Med. & Chir. Soc., London, '85-7, 2, 256.

No.	Operator.	Age and Sex.	History.	Date.	Result.	Authority.
64	Pugh.		Internal strangulation. Laparotomy.		Died	Liverpool Med. Chir. Jour., '87, 7, 734.
65	Knaggs.	M., 5½.	Intussusception. Operation on 3d day. Intestine through ileo-cæcal valve. Irreducible and gangrenous. Death in 1 1-2 hours.	1887	"	Lancet, '87, i, 1124.
66	Cheever.	M., 23	Volvulus of ascending colon and unattached cæcum. Death in 3 hrs.		"	Boston Med. Jour., '87, 17, 7.
67	Gay.	M., 14	Operation done for recent adhesions of intestine to abdominal walls, producing symptoms from which patient was sinking.	1887	Recovered.	Boston Med. & Surg. Jour., '87, 16, 25.
68	Rockwell.	F., 35	Obstruct. from band 1 year after peritonitis. Operation on 4th day.	Nov. 14, '87.	"	
69	Wight.	M., 22	Obstruction from band, following peritonitis 7 mos. previous. Op. on 5th day. Two large bands divided. Intestine 1 flamed. Death in 3 days.	Nov. 17, '87.	Died.	Personal communication.

Dividing these cases into groups, according to their cause, we have :

Intussusception,	-	-	-	-	-	-	-	11
Bands or adhesions,	-	-	-	-	-	-	-	24
Volvulus,	-	-	-	-	-	-	-	7
Biliary or intestinal calculi,	-	-	-	-	-	-	-	4
Diverticula	-	-	-	-	-	-	-	4
Unclassified	-	-	-	-	-	-	-	19
								69

Of these same classes the results of operations were as follows :

	RECOVERIES.				DEATHS.	
Intussusception,	-	-	-	-	6	5
Bands or adhesions,	-	-	-	-	14	10
Volvulus,	-	-	-	-	3	4
Biliary or intestinal calculi,	-	-	-	-	1	3
Diverticula,	-	-	-	-	0	4
Unclassified,	-	-	-	-	13	6
					37	32

This gives a mortality of 46 per cent., or a gain on the statistics previous to 1873 of 27 per cent, and this in spite of the fact that nearly two-thirds of the fatal cases were operated upon at a time or under conditions which would almost necessarily preclude successful results.

So far as I can judge from the titles or abstracts of cases omitted from the above list, the result of tabulating them would be a still stronger argument for early laparotomy. Of course statistics can give but a slight approximation to results even in cases submitted to operation, since many of the unsuccessful ones are never heard of, but in view of the terrible mortality in unrelieved cases, and the increasing success attending surgical interference, anything which promises a chance of recovery is better than what Bryant has sarcastically characterized as the "Surgery of Hope." And yet those who opposing early laparotomy as an unwarrantable interference with natural methods of relief, treat their patients upon this basis, seem guilty of the most startling inconsistencies. A curious example of this was seen in the report of a case presented to the London Clinical Society in 1879. Here the essentials of treatment consisted in daily enemata, hot fomentations, turpentine, croton and castor oil, the passage of rectal tubes, inversion of the patient and shaking her while in this position, kneading and manipulating the abdomen, galvanism, puncture of the bowels with a trocar, the internal use of extract of aloes, and a combination of enemata and kneading, and when the patient, with a meekness and endurance characteristic of her sex, obligingly lingered along until the fifty-ninth day, it is calmly announced that her death was sudden and unexpected.

In the discussion which ensued, no marked protest was made against the mode of treatment in this case, in fact some of the most objectionable features are still advocated by high authority, and it is this which makes the efforts at operative relief so unsuccessful, when applied as a *dernier ressort*. Certainly, no properly performed laparotomy could have inflicted upon this patient injury at all comparable with those just enumerated. As bearing upon the point now under discussion, I have run over the histories of the 32 fatal cases reported in my list, and find that of that number 20 were operated upon after

the third day, or were *in extremis* at the time of operation. Assuming that if operated upon before abdominal distention, inflammation and exhausted strength had enormously diminished their chances, they would have recovered, as similar cases in the same list did, we should have had the percentage of successes increased to 83 per cent. The assumption is not a strained or unfair one, as cases 6, 13, 16, 24, 49, 61 and 63 abundantly prove, and reference to any list of modern abdominal operations will confirm. I am, of course, aware that in many, perhaps most, of these cases the diagnosis is obscure or impossible, and believe that operative methods should be resorted to only when certainty or strong probability of obstruction exists, but surely in the few hours or days spent in coming to a definite conclusion as to the diagnosis, the patient can be spared the infliction of such harmful measures as those cited above. The time can be profitably occupied in a careful study of obscure points in the given case, in the administration of just enough morphia subcutaneously to control the shock always present in true obstruction, and to relieve pain, while at this time all food should be withheld if vomiting is present, and the patient sustained by small nutrient enemata, such as peptonized milk, while water to relieve thirst can be given in the same way, as I have proved after several ovariectomies and abdominal operations. Ice to suck, and perhaps the belladonna administered internally, as suggested by Dr. Kerr and other English writers—who believe that in some forms of obstruction its use, in doses of two grains every hour, is often preferable to opium—should be the only substances introduced into the stomach. At this point in a case, if the propriety of operating is doubtful, that of withholding all purgatives is not. Enemata, administered by gravity, can be made to carry such substances as ox gall, glycerin and oil well up into the intestine in some cases, and certainly are less harmful than air and carbonic acid, from the use of which several fatal cases have been reported. If the obstruction be from fecal impaction, or even intussusception, a cure may follow their use, as I have had occasion to prove in my own practice, in the case of a little girl of 2 years, who was relieved in less than an hour of an intussusception of the colon which had lasted over a day when

I first saw her. By adoption of such a plan of treatment as this the patient is at least kept in a condition favorable for spontaneous recovery in some forms of invagination and strangulation, and his powers conserved for repair if operation be decided upon. If, however, the symptoms persist, the diagnosis being still obscure, what are the indications and time for surgical relief? To these questions I cannot give a better answer than by quoting the argument of a recent writer on the subject, which seems to me absolutely convincing.¹

"To cases of acute obstruction there is practically but one termination—death. No case of volvulus, whether of large or small intestine, has as yet been known to recover under treatment purely medicinal. Spontaneous recovery, in the numerous class of cases of strangulation by bands is not to be looked for. In the case of intussusception, where we have been accustomed to look for favorable results without operation, it seems to me that Treves has made out a clear case against expectant treatment. Looked at from the side of causation or actual pathological condition, there is, practically, no expectation of recovery. Certainly ninety-five per cent of all such cases die.

Here, then, the indication is clear enough—as clear as the indication to tie a bleeding carotid—operation. In the sense of avoiding the risk of death, the indication is more definite than in external hernia; for in hernia there is a chance of recovery by gangrene. In the sense of promoting the chances of recovery, the indication is not so strong; for more cases of external herniotomy must always recover than of internal.

The risks are increased in the same way by waiting, and by handling or purgation, which are almost the same in evil effect. There is but one treatment—release the strangulated bowel from the strangulating band."

"At once, or within a few hours, we ought to make a definite diagnosis. If we are convinced that it is acute obstruction, then an operation should be performed at once; if we are convinced that it is not, another treatment equally definite ought to be pursued. From the beginning a definite plan of

¹Abdominal Surgery, J. Greig Smith, London, 1887, p. 372.

treatment ought to be laid down and adhered to. Let it be either drugs or operation, and never that fatal compromise—operation when drugs fail.”

As the choice and method of operation are purely surgical topics, and could be made to occupy an entire evening of themselves, I will confine my remarks on this point to running rapidly over what from reading and experience I deem to be the most practical means of arriving at the relief of the conditions present. The incision having exposed the dilated intestines it is a rule to which there are few exceptions that the coils first appearing at the opening are those most distended, and consequently intimately connected with the constriction, following them in the direction of increasing size and congestion or discoloration will generally lead at once to the obstructed point. Failing in this, the whole hand should be introduced and search gently made for the affected point. If necessary, the distended coils can be removed from the cavity, laid on flat sponges, and protected by warm aseptic flannels.

If very much distended they should be carefully incised transversely to their axis, and being held over a vessel at a proper distance from the incision, emptied of their contents, gaseous and feculent. When sufficiently emptied, the intestinal incision should be closed with a continuous silk or catgut suture, and returned.

Volvulus should be, if possible, untwisted and returned; the plan just spoken of in the treatment of distended intestine is applicable also to *volvulus*, and may render its unraveling easy, when otherwise impossible. Failing to reduce the twist, an artificial anus should be made at the nearest convenient point above the gut, or resection of the gut made, the latter method being extremely doubtful.

In *Intussusception*, if early laparotomy has been done, the chances for simply reducing the invagination are excellent, as in Sands' celebrated case. A delay of two days, especially in the young, may prove sufficient time for adhesive processes to have occurred which may render all attempts useless. In such cases Nelaton's operation for artificial anus should be made, or resection of the gut done, with formation of an artificial anus, or resection with suture of the divided ends. The operations

are of value in the order named, the first being applicable to most cases, and available where neither of the others is, though all are followed by large mortality.

In *Obstruction by bands or diverticula*, the constricting mass should be divided between two ligatures if solid, the ligature being tightly knotted near the intestine, or in cases of large solid adhesions transfixing the band near the intestine. Search should always be made for other adhesions near the one causing the obstruction, as they are often multiple, as in the case which closes this paper.

In intestinal diverticula which are connected with the lumen of the gut, the best plan of treatment would probably be that suggested by Smith. This consists in pushing inward the mucous membrane after division, and ligaturing the fibrous coat outside it. The treatment of other conditions often found in these cases must be left to the individual judgment of the surgeon, guided by the laws of modern abdominal surgery, always remembering the dictum of the writer already quoted that "A man who enters the abdominal cavity ought to be able to do anything, from ligature of a vessel to resection of the intestine; and he ought to be prepared to do this in a manner which defies the criticism of his brethren."¹ I cannot close this paper more appropriately than by giving a brief history of a recent case in which the application of the principles here enumerated was the direct means of saving a valuable life, otherwise most certainly doomed.

ACUTE OBSTRUCTION FROM BAND.—LAPAROTOMY.—RECOVERY.

CASE III.—Mrs. K. A., 41, was seized at 1 A. M., on the morning of Nov. 10, 1887, with a slight colicky pain in the region of the transverse colon, this gradually increased in severity, and was followed by vomiting of partially digested food from meal of previous evening. Under the influence of one-fifth grain of morphia given by her husband (a physician), the pain subsided, and a quiet interval of a few hours ensued. The pulse and temperature were about normal at 7 A. M., when an enema was given, bringing away a small amount of softened fæces. Another one-fifth of morphia was given, under which the patient was again comfortable for three hours.

¹Smith, loc. cit., p. 73.

For the following three days the patient remained about the same; little or no tenderness of the abdomen, tympanites or increase of temperature; no nausea or vomiting, except on attempting to take food. Enemata were given repeatedly and carried high into the bowel by a long rectal tube, but little or no fecal matter came away. Morphia was continued in doses of one-fifth grain every three hours. On the evening of the 12th a severe attack of pain came on, requiring large doses of morphia to control it. Dr. J. A. McCorkle now saw the patient, and suggested the use of small doses of gelseminum, with a view to controlling a possible enteralgia, and also citrate of magnesia on the following morning. Under this treatment and morphia the patient passed a fair night, but rejected the laxative soon after taking it.

Nov. 13th.—Once or twice during the day a little egg-nog was swallowed, but at 3:30 P. M. vomiting again began, and soon became stercoreaceous. The diagnosis of obstruction was now made, and I was asked to see the patient at 9:30. I found her sitting up in bed, complaining of little or no pain, pulse; 100, temperature, 99°. She located the obstruction in left iliac fossa, said she had dreaded some complication of the kind ever since a severe attack of peritonitis in 1886, and begged for an exploratory operation at once. An O'Beirn tube was now introduced (with the patient *a la vache*) to a depth of 14 inches, and an enema of oxgall and glycerine given, but with no result.

Examination per vaginam throwing no light on the case, morphia was again given, under which the patient passed a comfortable night.

Nov. 14.—At 11 A. M., with the assistance of Dr. McCorkle, Fowler and George R. Westbrook, laparotomy was done as follows. The abdomen having been thoroughly cleansed with mercuric biniodide, and the field of operation surrounded with towels sterilized in the same solution, an incision was made from the umbilicus to the pubes, through which distended coils of intestines at once protruded. These were followed in the direction of greatest discoloration and congestion, until a point was reached at which a constricting band could be identified.

This was no easy matter, as the swollen coils took up so much room, that I was finally obliged to remove about twelve feet of them from the cavity, and laying them carefully on large sterilized sponges, cover them with warm aseptic flannels, and commit them to the care of an assistant. Though the band could now be plainly felt and seen, it lay at such a depth that I was obliged to prolong the incision through the umbilicus two or three inches more before I could reach it to divide it. The distended coils were of a deep plum color in the vicinity of the

stricture, but had not yet quite lost their polish, and, as I gently drew them out of the abdomen, the serous surface of the one nearest the constriction gave way and bled slightly. From this fact I argued the propriety of returning them, without an enterectomy, and having closed the tear with three Lembert sutures of silk, and ligated two or three bleeding points in the mesentery with catgut, I divided the band between two silk ligatures, and withdrew the strangulated loop from the abdomen. As it filled with the gas from adjacent coils, it seemed in quite as good condition as the gut in its vicinity. The constricting band ran from one coil of the ileum to another, lying parallel to it, and was about an inch long. Under this the obstructed loop (about 14 inches in length) had become entangled. About 12 inches higher up on the same two coils of the ileum was another band, about one and three-fourths inches in length, which was also divided, to prevent future mischief. Although the distended coils outside the abdomen were with difficulty returned to the cavity, I thought best to avoid further shock, which would certainly follow an enterotomy for their relief, and accordingly I rapidly cleansed the peritoneal cavity, and closed the wound with interrupted silk sutures. A dressing of iodoform and paper wool was applied, and the patient put to bed, having been under ether a little over an hour. The patient rallied well, but soon began to complain of severe pain about the umbilicus, which was quieted at 5 : 30 by m_x Magendie hypodermically, the pulse falling from 120 to 84. This pain was probably due, in a large measure, to the sudden influx of blood to the vessels of the strangulated loop, as from this time no further symptoms of the kind appeared.

Nov. 15.—Patient is taking fss of hot water every half hour. No pain till early this morning; easily quieted by m_v Magendie; temperature, $100\frac{1}{5}^{\circ}$, pulse, 84; passing large amounts of flatus through rectal tube, and lying on left side. Towards evening a slight fecal movement occurred, and the temperature fell to $99\frac{1}{5}^{\circ}$. Slept four hours without opium.

Nov. 16.—Perfectly free from pain. Abdomen subsiding so rapidly that rearrangement of bandage is necessary; temperature, 99° , pulse, 84. Tongue clean and moist. Small amounts of peptonized milk given at short intervals, alternating with beef juice.

Nov. 17.—Had food at 3 A. M., after a fair night's rest, and slept again until 7. Is free from pain, and eager for food. Took during the 24 hours Ojss clam broth; same amount of peptonized milk and Oj champagne.

Nov. 18.—Patient has slept well, but this morning complains of great flatulence. A rectal tube worn during the day, and the patient's

position changed to the side ; large quantities of gas discharged by this means.

Nov. 21.—To-day bowels were moved for the first time by a glycerine and ox gall enema. An enormous evacuation, completely filling the bed pan, was the result.

Nov. 23.—For two days has been sitting up a little in bed. The bowels have been moved each day by enemata, and the diet has been increased by the addition of farinaceous food and milk, with raw oysters and champagne.

Nov. 24.—The patient complained of severe pain in the back, yawning and wandering pains in the limbs, followed by slight fever. These symptoms were succeeded by a chill on the next morning, and yielded in a few days to quinine. With this exception the patient's further progress to recovery was uninterrupted. The stitches were removed *Nov. 25*, the wound having healed under one dressing.

So far as I can learn, this is the first successful case of laparotomy for acute intestinal obstruction in this city.

AN EXPERIMENTAL CONTRIBUTION TO INTES- TINAL SURGERY WITH SPECIAL REFER- ENCE TO THE TREATMENT OF INTESTINAL OBSTRUCTION.¹ (CONTINUED.)

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II.—ENTERECTOMY.

IT still remains an open question to what extent resection of the small intestines can be performed with impunity. It is true that Koeberlé, Kocher and Baum, have successfully removed respectively 2.05m., 160ctm., and 137 ctm. of the small

¹Read in the Surgical Section of the Ninth International Medical Congress, Washington, September 5.

intestine in the human subject, but while two of the patients do not appear to have suffered any ill effects in consequence of the removal of such a large surface for digestion and absorption, in Baum's case death, which supervened six months after the operation, was attributable clearly to marasmus, brought about by the extensive intestinal resection. As in a number of pathological conditions of the intestinal canal, as multiple strictures, gangrene, and multiple gunshot wounds, where the wounds are large and in close proximity, it may become necessary to resort to extensive resection, it becomes an important matter for the surgeon to know how much of the intestinal tract can be removed without any immediate or remote ill consequences.

The immediate danger attending such an operation is the traumatism, which, of course, will be proportionate to the length of the piece of intestine removed, while the remote consequences are due to impairment of the function of digestion and absorption caused by the shortening of the intestinal canal. With the view of obtaining additional light on these important questions the following experiments were undertaken.

Experiment 26.—Dog, weight 22 pounds. Mesentery divided into four portions and tied with catgut, and 30 inches of the ileum from near the ileo-cæcal regions upwards excised and ends sutured together by Czerny-Lembert sutures. Abdominal wound failed to unite, and a copious sero-sanguinolent discharge escaped from it the last day. Death on fifth day from peritonitis. Peritoneal adhesions in abdominal wound only partial: omentum adherent to wound. Intestines firmly adherent to omental stump. Circumscribed gangrene of bowel on convex side at site of operation, Recent diffuse peritonitis caused by perforation.

Experiment 27.—In a cat 12 inches were removed from the middle of the ileum, and the ends united by a double row of sutures, mesenteric vessels tied *en masse* with one catgut suture. The animal never rallied from the operation, and died the same night of the shock.

Experiment 28.—Dog, weight 36 pounds. Mesentery tied in several sections with catgut ligatures; ileum divided just above the ileo-cæcal valve and six feet of the small intestines excised, and the ends united by Czerny-Lembert sutures. On the third

day the fæcal discharges were bloody. Although the appetite remained good, and the dog was allowed to eat as much as he desired, he lost several pounds in weight during the first week. On the third day the abdominal wound opened as the sutures had cut through and required re-suturing. After this time the wound healed kindly. Three or four fluid fæcal discharges during 24 hours. The character of the discharges remained the same, and several microscopic examinations made at different times revealed the presence of free undigested fat. The dog was kept busy eating most of the time, and although the most nourishing food was furnished, he emaciated to a skeleton. He was killed 161 days after the operation. Marasmus extreme, hardly a trace of fat could be found anywhere in the tissues. Stomach enlarged to three or four times its normal size, and distended with food. A slight thickening of the wall of the gut indicated externally the site of suturing, and the lumen of the bowel at this point was slightly diminished in size. At point of operation a loop of intestine was found adherent and somewhat contracted. The remaining portions of the small intestines, only 45 inches in length, seemed to have undergone compensatory hypertrophy, as the coats were much thickened and exceedingly vascular. At the seat of suturing the mucous membrane presented a slight circular prominence. Pancreas, liver, and spleen were normal in size and appearance.

Experiment 29.—Medium-sized, adult dog. Mesentery tied in several sections, and 8 feet and 2 inches of the small intestines from ileo-cæcal region upwards excised and ends sutured in the usual manner. On the following day the dog vomited, and blood was seen to escape from the abdominal wound. Death three days after operation. The abdominal cavity was filled with fluid and coagulated blood, which on closer inspection was found to have escaped from one of the stumps of the mesentery, where the catgut ligature had slipped off.

Experiment 30.—Scotch terrier, weight 10 pounds. Mesentery ligated in parts with catgut ligatures, and the ileum divided 4 inches above the ileo-cæcal region, and 50 inches of the small intestines excised, and the continuity of the intestinal canal restored by the usual method of suturing. Some difficulty was experienced in suturing as the lumen of the upper end was considerably larger than that of the lower. Until four weeks after the operation the dog, although eating well, seemed to become more and more emaciated. After this time he gained somewhat in weight until killed 47 days after the resection. During the whole time the fæces were either fluid or only semi-solid, and at different times contained free, undigested fat. Appetite most of the time

voracious. No adhesions to abdominal wound. Omentum adherent to visceral wound and to bowel. The site of operation is indicated by a slight depression on the surface of the bowel. On palpation a ring-like thickening is felt corresponding to the united ends of the bowel. Bowel above seat of resection somewhat enlarged. On cutting into the bowel the point of union is indicated by a circular prominence of mucous membrane. Nine of the deep sutures were found still attached to the mucous membrane. The entire tract of the small intestines which remains measures only two feet and ten inches in length.

Experiment 31.—Adult maltese cat. The mesentery was tied in five sections with catgut ligatures corresponding to 29 inches of the ileum which was excised. Previous experience in circular enterorrhaphy had satisfied me that perforation is most likely to take place on the mesenteric side of the bowel, where on account of the triangular place made by the reflections of the peritoneum the muscular coat is not covered by serous membrane. To obviate this difficulty I secured a continuity of the serous covering of the ends of the bowel before suturing by drawing the peritoneum over this raw surface by a fine catgut suture. The mesentery was detached only to a sufficient extent to apply the second row of sutures. The fine catgut suture to approximate the edges of the peritoneum must be applied near the margin of the divided end of the bowel, so that the knot will not interfere with the accurate coaptation of the serous surface between the deep and superficial row of sutures. This modification of circular suturing was adopted for the first time in this case. Although the animal manifested no untoward symptoms, and the appetite remained good, the marasmus was progressive until the time of killing, 12 days after the excision. Abdominal wound not completely united. Intestinal wound, which was two inches above the ileo-cæcal region, completely healed. The sutured surface was adherent to loop of bowel which caused a sharp flexion. Intestine above this point somewhat dilated and partially distended with fæcal accumulation. Slight contraction of the lumen of bowel by circular bulging of mucous membrane, in which most of the deep sutures remained fixed. The post-mortem appearance points to partial obstruction at point of flexion; remaining portion of small intestines measures only 21 inches in length.

Experiment 32.—Medium sized Maltese cat. Mesentery tied in sections, and 34 inches of the small intestines excised and the divided ends united in the same manner as in the last case, special care being taken to secure an uninterrupted peritoneal surface for divided ends be-

fore suturing. Appetite remained good, but progressive marasmus which appeared at once, continued and proved the direct cause of death 21 days after the excision. Abdominal wound firmly united. No peritonitis, Visceral wound completely united; intestine at site of operation covered with adherent omentum.

EXCISION OF COLON.

Experiment 33.—Large, black cat. The meso-colon was divided in numerous sections, and each part separately tied with a catgut ligature. As the meso-colon was very short, a number of the ligatures slipped off and had to be replaced by fine silk ligatures. The entire colon and about two inches of the lower end of the ileum were excised. As it was found impossible to unite the bowel on account of the deep location of the rectal end, it became necessary to close the distal or rectal end by inverting its margins and applying a continuous suture. An artificial anus was established by stretching the ileæ or proximal end into the abdominal wound. Death from shock a few hours after the operation.

Experiment 34.—Medium-sized dog. Resection of entire colon and three inches of ileum. Meso-colon divided into sections and ligated with silk ligatures. In order to enable circular enterorrhaphy it was found necessary to excise a triangular piece from large distal end, so as to make its lumen correspond to that of the divided ileum. After this was done and the lateral wound closed by two rows of sutures, the ends of the bowel were united in the usual manner. Death from shock six hours after operation.

Experiment 35.—Excision of entire colon and two inches of ileum in a cat. Excision of a triangular piece from distal end to narrow the bowel sufficiently, so that its lumen should correspond to that of the ileum. The ileum and rectum were then united by Czerny-Lembert sutures. The animal never rallied from the prolonged operation, and died of shock two hours later.

REMARKS.—The results of these experiments speak for themselves. In all cases of extensive resection of the small intestines where the resected portion exceeded one-half of the length of this portion of the intestinal tract, where the animals survived the operation, marasmus followed as a constant result, although the animals consumed large quantities of food. In all of these cases defective digestion and absorption could

be directly attributed to a degree of shortening of the digestive canal incompatible with normal digestion and absorption. Only one of these animals (experiment No. 27) died from shock a few hours after operation. Another death resulted from the trauma in experiment No. 39, where fatal hæmorrhage occurred from one of the mesenteric vessels where the catgut ligature became displaced from shrinkage of the included mesenteric tissues. When the vessels of the omentum or mesentery are tied *en masse* there is always danger from this source, and to prevent this accident it becomes necessary not to include too much tissue, and to tie firmly with fine threads of aseptic silk. After I commenced to tie in this manner, I encountered no further difficulty in arresting and preventing hæmorrhage in operations requiring incision of these tissues. Although the large artery running parallel with the bowel where the mesentery is attached was excised in every case with the intestine, gangrene and perforation occurred only in experiment No. 26. The post-mortem appearances after extensive enterectomies indicated that the portion of bowel which remains undergoes compensatory hypertrophy, but as a rule the increased functional activity is not adequate to make up for the great anatomical loss. In all instances where the animal recovered from the operation the discharges from the bowels were frequent, fluid or semi-fluid, and contained undigested food, among other substances, free undigested fat, showing that the intestinal secretions play an important role in the digestion of fat. As an approximate estimate the statement can be ventured that in dogs and cats the excision of more than one-third of the length of the small intestines is dangerous to life, as it is followed by marasmus, which sooner or later results in death. As all three cases of excision of the colon proved fatal from shock in from two to six hours, it can be safely asserted that this operation is impracticable, and is invariably followed by death from the immediate results of the trauma.

PHYSIOLOGICAL EXCLUSION.

As extensive resections of the intestines are always attended by great risks to life from the trauma, I concluded to study

the subject of sudden deprivation of the system of a great surface for digestion and absorption by eliminating or diminishing the cause of death from this source by leaving the intestine, but excluding permanently a certain portion from participating in the function of digestion and absorption, in other words, by resorting to physiological exclusion. These experiments were also made to determine the tissue changes which would take place in the bowel thus excluded, and to learn if under such circumstances accumulation of intestinal contents would become a source of danger as had been feared by the older surgeons. The complete interruption of passage of intestinal contents either by section and closure of the bowel, or by making an intestinal obstruction of some kind, and the restoration of the continuity of the physiologically active portion of the intestinal canal was established by suturing of the proximal end of the high section with the distal end of the lower section, or by implanting the proximal end into the bowel lower down, the intervening portion of the intestinal tract in either case, thus becoming the excluded portion.

Experiment 35.—Large cat, weight 9 lbs. Double division of small intestines, upper section made about eight inches below the pylorus, and the lower three feet lower down; the portion of bowel between these circular sections was closed at both ends, and the continuity of the intestinal canal restored by suturing the open ends in the usual manner. In this way three feet of the small intestines were isolated and completely excluded from the digestive canal. The intervening portion was emptied of its contents as completely as possible before its ends were closed by suturing. The animal died on the fourth day after the operation. A small perforation of the sutured bowel on the mesenteric side was found, otherwise the visceral wound was found well united. The perforation had given rise to diffuse peritonitis which was the immediate cause of death.

Experiment 36.—Dog, weight 32 lbs. The jejunum was divided four feet above the ileo-cæcal region, and the distal end closed. Jejunocolostomy was made by implanting the proximal end into a slit made into the convex side of the ascending colon, large enough to correspond to the circumference of the jejunum. The implanted end was fixed in its position by two rows of sutures. The animal never appeared to rally from the effects of the operation, and died at the end

of the next day. The abdominal cavity was found filled with blood, which must have escaped from a mesenteric vessel from which probably the catgut ligature had slipped. The excluded portion, that is, that portion intervening between the circular section and the point of implantation, was found quite empty of intestinal contents, but slightly distended with gas. Implanted end perfectly retained by sutures and slight adhesions between serous surfaces had already taken place. Death in this case was the result of secondary hæmorrhage.

Experiment 37.—Dog, weight 35 lbs. Divided the ileum just above the ileo-cæcal region, and closed both ends of the bowel. Ileo-colostomy was done by making an incision about an inch and a half in length on concave side of ileum, 44 inches above the division and a similar slit on convex side of ascending colon, and uniting these wounds by Czerny-Lembert sutures, thus excluding from the intestinal circulation 44 inches of the bowel. The day after operation the fæces contained blood. During the progress of the case it is frequently noted that the stools were thin, sometimes liquid. Appetite remained good, and animal was well nourished at the time of killing, twenty-five days after operation. Abdominal wall well united. The omentum and a few intestinal loops adherent to inner surface of wound. The excluded portion contracted to more than one-half of its usual size, atrophic, and not nearly as vascular as remaining portion of intestinal canal, the two blind ends adherent to each other and to adjacent loops. The excluded portion contained in its blind end a few sharp fragments of bone. The new opening between the ileum and colon about the capacity of the lumen of the ileum, surrounded by a prominent margin of mucous membrane, which somewhat resembles the ileo-cæcal valve to which still remain attached about ten of the deep sutures. The coats of both bowels at points of approximation thickened by inflammatory exudation.

Experiment 38.—Young cat. The ileum was divided about 30 inches above the ileo-cæcal region; the distal end closed and proximal end laterally implanted into the convex side of the transverse colon, where it was fixed by a double row of sutures. Before implantation the continuity of the peritoneal surface was procured by drawing the peritoneum with a fine catgut suture over the denuded space left after detachment of the mesentery. Although the animal partook freely of food, progressive marasmus set in, to which the cat succumbed eleven days after the operation. Abdominal wound completely healed. Union of implanted ileum with colon perfect. No peritonitis. Excluded portion empty. Bowel above implantation somewhat dilated.

Experiment 39.—Young, but full grown cat. Physiological exclusion of two-thirds of the small intestines, and the entire colon by division of the small intestines at the junction of the upper with the middle third. Closure of distal end, and restoration of continuity of the shortened intestinal tract by making a jejunum-rectostomy. The implantation was made into the upper portion of the rectum at a point opposite the meso-rectum. Previous to section and suturing, the portion of bowel to be excluded was emptied of its contents. Animal died two days after operation. No peritonitis. Slight adhesions between the serous surfaces of rectum and implanted jejunum; excluded portion empty.

Experiment 40.—The entire ileum was excluded in a cat by dividing the intestine at its junction with the jejunum, closure of distal end and making a jejunum-colostomy by implantation of the proximal end into a slit of the transverse colon at a point opposite the meso-colon. The cat remained in good condition until killed 15 days after operation. No vomiting, and movements from bowels normal. Abdominal wound completely closed; no peritonitis; jejunum at point of implantation firmly united; new opening in colon the size of the lumen of the ileum. Excluded portion empty, contracted and anæmic.

Experiment 41.—Large mastiff. The small intestine was divided six and a half feet above the ileo-cæcal region, the distal end closed, and the proximal end implanted into an incision of the transverse colon large enough to receive it at a point opposite the meso-colon. Suturing was done exclusively with fine silk. For three weeks the dog appeared quite well, ate well, and the discharges from the bowels were normal. From this time the emaciation, which commenced soon after the operation was done, began to increase rapidly, the animal began to refuse food, and died of marasmus 32 days after operation. No peritonitis. Excluded portion empty, and reduced one-half in size; the coats of the bowels very much attenuated, and the vessels hardly half the normal size. Only three feet and five inches of the small intestine remained for physiological action; new opening in colon sufficiently large to permit the introduction of the index finger as far as the first point. On slitting open the colon the point of juncture with the jejunum upon the inner surface is marked by a slight ridge of mucous membrane, which bears a faint resemblance to the ileo-cæcal valve.

REMARKS.—For some reason which I am unable to explain satisfactorily, in animals where the same length of intestine was

physiologically excluded, as in the resection experiments, the appetite never became so voracious and the remaining portion of intestine did not undergo the same degree of compensatory hypertrophy as in the excision experiments. Theoretically, two explanations might be advanced; firstly, in shortening the intestinal canal by resection an extensive vascular district is cut off by ligation of the mesentery, and it is only reasonable to assume that the circulation in the remaining branches of the mesenteric artery would be increased, and consequently the functional activity of the organs supplied by them augmented; secondly, in cases of physiological exclusion by lateral apposition it is possible that at least some of the fluid contents reached the excluded portion from which a certain amount might still have become absorbed. The exclusion was complete or nearly so, hence, we must conclude from the post-mortem appearances, that in nearly every instance, the excluded portion presented an atrophic, contracted condition and was only sparingly supplied with blood vessels. From a practical standpoint these experiments teach us that a limited portion of the intestinal canal can be permanently excluded from the processes of digestion and absorption in proper cases by operative measures without incurring any risk of fæcal accumulation in the excluded part. These experiments demonstrate also that physiological exclusion of a certain portion of the intestinal tract is a less dangerous operation than excision, and that in certain cases of intestinal obstruction, where excision has been heretofore practiced, it can be resorted to as a substitute for this operation in cases where excision is impracticable, or where the pathological conditions which have caused the obstruction do not in themselves constitute an intrinsic source of immediate or remote danger to life. The post-mortem appearances of the specimens of these experiments tend to prove that as long as any of the contents of the intestines reach the excluded portion the peristaltic or anti-peristaltic action in that part is effective in forcing it back into the active current of the intestinal circulation.

III.—CIRCULAR ENTERORRHAPHY.

During my experimental work I became convinced that circular enterorrhaphy as it is now commonly performed is attended by three great sources of danger: 1, Perforation at the junction not covered with peritoneum; 2, the length of time required in performing the operation; 3, too many sutures.

To obviate the danger of perforation at the junction of the bowel not covered by serous membrane, I resorted to peritoneal suturing before uniting the bowel by drawing the peritoneum over the denuded space caused by the limited detachment of the mesentery by a fine catgut suture applied near the free margin of the bowel as described before. This requires but little time, and secures for the whole circumference of the bowel a peritoneal covering, so that after the bowel has been sutured the great rule inaugurated by Lembert (serosa against serosa) has been carried out to perfection. The results showed that this little modification of the ordinary method of suturing yielded more satisfactory results, and should therefore be adopted in all cases where circular enterorrhaphy is done with Czerny-Lembert or Lembert's sutures. Time plays an important factor in determining the results of all operations requiring abdominal section, and this is especially true in all operations for intestinal obstruction, as this class of patients are usually greatly exhausted before consent for an operation can be obtained. With a patient exhausted from an acute attack of obstruction of the bowels, it becomes exceedingly important to consume as little time as possible in the operation, as the shock incident to a long operation may itself determine a fatal result. Even after I had acquired a fair degree of manual dexterity in suturing the bowel, I seldom spent less than an hour in making a circular enterorrhaphy by a double row of sutures. In opening the abdomen for intestinal obstruction, usually a considerable length of time is spent in finding the obstruction, and when this is found and the patient manifests symptoms of collapse, a radical operation, which for its performance requires an hour or more, is often abandoned and the operation is finished by making an artificial anus, which at

the present time must be looked upon as a reproach upon good surgery. The last objection to the Czerny-Lembert method of suturing requires no argument. Any surgeon who hastily transfixes the bowel with a needle from 30 to 40 times in applying the Lembert suture is liable to perforate the whole thickness of its walls once or more; and if silk is used as suturing material, the puncture may become the seat of a perforation, and the direct cause of a fatal peritonitis. This is more particularly the case in operating on the bowel in cases of intestinal obstruction, as under such circumstances the walls of the bowel have become greatly attenuated from overdistention, and consequently more liable to become perforated by the needle. But the use of so many sutures, from 30 to 40 as recommended, brings with it another source of danger—gangrene of the inverted margin of the bowel. The second row of sutures applied in such close proximity must materially affect the blood supply to the inverted margin of the bowel, which in some instances must terminate in gangrene. Such a result is the more likely to ensue as the inner surface of the bowel is exposed to all dangers incident to infection from the intestinal canal,—in other words, an aseptic condition for one side of the wound cannot be secured, consequently the gangrene is of a septic character, which is prone to extend beyond the primary cause which produced it. To obviate some of these dangers I experimented with a modification of Jobert's invagination suture. According to Madelung the ingenious method of circular suturing devised by Jobert was practiced only in four cases, and two of the patients are known to have recovered. A number of years ago, I was forced to resort to resection of a part of the small intestine in a very complicated case of ovariectomy and resorted to this method, and although the patient died 48 hours after the operation from causes outside of this complication the bowel was found permeable and quite firmly united, and had the patient lived, I have no doubt the result of the resection and suturing would have been satisfactory. In Jobert's method the invagination sutures must be looked upon as a source of danger, as they were made to traverse the entire thickness of the wall of the bowel, and the material used was silk. It has been claimed that in this method the invaginated

portion of the bowel becomes gangrenous as in cases of invagination from pathological causes. This claim has arisen from a theoretical, and not from an experimental standpoint. In cases of invagination the intussusceptum carries with it the mesenteric vessels intact in the form of an arch which by constriction at the neck of the intussusciens is prone to become strangulated, an event which is followed by œdema and inflammatory swelling of the invaginated portion which rapidly tends to complete venous stasis and gangrene. In circular suturing by Jobert's method the intussusceptum has no vascular connection with the intussusciens. The vascular arch is interrupted and consequently the danger arising from venous obstruction is almost completely obviated. My experiments will show that gangrene of the invaginated portion as a rule does not occur. My modification of Jobert's method consists essentially in the use of a thin elastic rubber ring for lining the intussusceptum to prevent ectropium of the mucous membrane, to protect the mucous membrane of the bowel against injurious pressure from the suture, to keep the lumen of the bowel patent during the inflammatory stage, and to assist in maintaining coaptation of the serous surfaces, and finally the substitution of catgut for silk as invagination sutures. My method of proceeding is as follows: The upper end of the bowel which is to become the intussusceptum is lined with a soft pliable rubber ring made of a rubber band, transformed into a ring by fastening the ends together with two catgut sutures. This ring must be the length of the intussusceptum, from one-third to half of an inch, the lower margin is stitched by a continuous catgut suture to the lower end of the bowel which effectually prevents the bulging of the mucous membrane a condition which is always difficult to overcome in circular suturing. After the ring is fastened in its place the end of the bowel presents a tapering appearance which materially facilitates the process of invagination. Two well-prepared fine juniper catgut sutures are threaded each with two needles. The needles are passed from within outwards transfixing the upper portion of the rubber ring and the entire thickness of the wall of the bowel and always equidistant from each other; the first suture being passed in such a manner that each needle is brought out a short dis-

tance from the mesenteric attachment, and the second suture on the opposite convex side of the bowel. During this time an assistant keeps the opposite end of the bowel compressed to prevent contraction and bulging of the mucous membrane. The needles next are passed through the peritoneal, muscular and connective tissue coats at corresponding points about one-third of an inch from the margins of the opposite end of the bowel, and when all the needles have been passed an assistant makes equal traction on the four strings and the operator assists the invagination by turning in the margins of the lower end evenly with a director, and by gently pushing the rubber ring completely into the intussusciens. The invagination accurately made, the two catgut sutures are tied only with sufficient firmness to prevent disinvagination should violent peristalsis follow the operation. This is their only function. The invagination itself effects accurate, almost hermetical sealing of the visceral wound. The intestinal contents pass freely through the lumen of the rubber ring from above, downwards and escape from below is impossible as the free end of the intussusciens secures accurate valvular closure. After a few days the rubber ring becomes detached, and by giving way of the catgut sutures is again transformed into a flat band which readily passes off with the discharges through the bowels. The invagination sutures of catgut are gradually removed by substitution on part of the tissues, hence the punctures in the bowel remain closed either by the catgut or by the products of local tissue-proliferation; and thus extravasation is prevented. In my first experiments I used three invagination sutures, but found by experience that two are just as efficient in making and retaining the invagination. No superficial or peritoneal sutures were used in any of the cases, sole reliance being placed upon the invagination to maintain approximation and coaptation. The mesenteric attachment, both of the intussusceptum and intussusciens was separated only a few lines to enable invagination without too much narrowing of the lumen of the intussusciens.

Experiment 42.—Dog, weight 15 pounds. Three invagination sutures were used. The ileum was cut completely across at a point

about three feet above the ileo-cæcal region. Depth of invagination one inch. For two days after operation a slight rise in temperature; no symptoms of obstruction during the whole time. Animal in good condition when killed two weeks after operation. Omentum adherent at point of operation as well as on adjacent loop of intestine. Union between intussusceptum and intussusciens firm, no signs of gangrene. Narrowest portion of lumen of bowel was large enough to pass the little finger to second joint. An enterolith composed of fragments of wood, bone, etc., in the centre of which the straight rubber band which had been the rubber ring, was found just above the seat of operation. No distention of the bowel above this point. Bowel considerably flexed at seat of invagination, this condition being evidently brought about by inflammatory adhesions.

Experiment 43.—Dog, weight 20 pounds. Section of bowel and invagination with rubber ring the same as in the foregoing experiment. In subsequent history no mention is made of any symptom of obstruction. but for the last few weeks it was noticed that the dog began to emaciate. He died suddenly 81 days after the operation. Diarrhœa was a prominent symptom toward the last. No adhesions and no peritonitis. An enormous enterolith composed of all kinds of crude material, and again holding in its centre the rubber band, was found just above the invagination. Bowel at this place considerably dilated. Intussusceptum firmly adherent, a false passage admitting the tip of the little finger had been made on one side between it and the intussusciens. Death in this case was evidently produced by the enterolith. In this, as in the last case, the invagination was made at least an inch in length, and the collection of the crude, indigestible material, which the dog must have eaten in large quantities, around the detached rubber ring gave rise to the enterolith. The wall of the bowel surrounding the foreign body was not only dilated, but also greatly thickened. It is a well known fact that even a moderate degree of stenosis of the bowel in dogs is liable to give rise to the formation of an enterolith, as the crude material which these animals swallow becomes arrested and by constant accretions of the same kind of material, the enterolith forms and continues to increase in size until its presence causes catarrhal inflammation and finally intestinal obstruction.

It is quite possible that the lower end of the intussusceptum in the last case became impermeable during the inflammatory stage, and that the false passage was formed on this account by perforation on one side of the intussusceptum, an accident which was plainly traceable to too deep invagination.

Experiment 44.—Dog, weight 40 pounds. This experiment is interesting only from the fact that it shows that it is possible to make a mistake in the direction of the invagination, even after the operation has determined with accuracy which is the ascending and descending end of the gut, and to show the disastrous consequences which must necessarily follow such a technical mistake. The invagination was made in the usual manner with rubber ring and three catgut sutures. The animal appeared to be quite ill the day following the operation, and on the next day the thermometer showed a rise in temperature to 104.2°F. On the third day the dog died with well marked symptoms of perforative peritonitis. Recent peritonitis with some agglutinations of intestines. Considerable quantity of sero sanguinolent fluid in the peritoneal cavity. To my utter astonishment, I found that an ascending invagination had been made. Circular gangrene of intussusceptum and complete separation of ends was found. The rubber ring remained *in situ* still attached to the intussusciens by the catgut sutures, which had become somewhat softened. The invagination had decreased considerably by the traction caused by the peristalsis and by the pressure of the intestinal contents from above the obstruction, and the extensive gangrene of the bowel was undoubtedly determined to a great extent by these causes.

Experiment 45.—As an illustration of another source of danger due to faulty technique, I will relate this experiment. Medium-sized dog. Circular enterorrhaphy was done with the rubber ring two feet above the ileo-cæcal valve. In making the invagination it was noticed that the ring was too large, as it was seen that it caused too much pressure. Thinking that the parts might adapt themselves to this pressure, the bowel was replaced and the abdominal wound closed. The dog died 36 hours after the operation. Abdominal wound not united; omentum and intestines adherent to each other, and at point of operation. The circumscribed gangrene of the intussusciens was evidently entirely due to pressure on part of the rubber ring. The intussusciens was much swollen, a condition which materially aggravated the pressure caused by the rubber ring. With the following experiment two new departures were inaugurated, viz.: Instead of three invagination sutures only two were used, a change which still further shortened the time for performing the operation, and the use of Nothnagel's test in determining the direction in which the invagination should be done. In all of the remaining experiments of circular enterorrhaphy which were made only two catgut sutures were used. Until now it was always necessary to find one of the extremi-

ties of the small intestines for the purpose of determining which was the afferent and which was efferent end of the tube, so as to make the invagination in the right direction, a procedure which often required considerable time, and brought additional risk by increasing the shock of the operation and the danger of traumatic infection.

[TO BE CONTINUED].

ERASION OF THE KNEE JOINT.

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THE operation known as erosion or arthrectomy of the knee joint, can scarcely yet be said to have attained its full significance, or become so developed and perfected as to claim the title of an universally recognized and adopted surgical procedure. It is true that many operators have performed it, yet the published accounts of their methods, and especially of the ultimate results obtained, are by no means numerous in comparison with the number of cases in which the operation seems to have been adopted. Hopes may be entertained, however, that this will be altered, and the next few years find the literature of this operation more explicit, and the methods of its performance more generally and better understood. I do not propose to enter into the question of priority of invention of this operation. Such matters are difficult to solve with justice, and the study is an unprofitable one. We may readily understand how the necessity for operations of this kind has gradually arisen. The result of formal excisions of the knee were not such as to satisfy individual operators. A large number of excisions were undertaken for cases of synovial disease where the bones, if at all implicated, were quite superficially affected. The removal of slices of bone and impairment of proper growth which ensued in consequence seemed unsatisfactory. Soon less extensive operations began to be devised. Most of these seemed to err on the side of insufficient removal

of disease. Some surgeons attempted the extirpation of the diseased membrane by the action of strong acids—others attempted its removal by having recourse to the use of a sharp spoon or curette introduced into the joint through openings or sinuses. Some of these operations were dignified by such titles as partial excision, and indeed it is a matter of some difficulty to definitely decide as to what is meant by the term “*eration*” of a joint, and to what class of cases the operation is to be restricted. So far as I can understand, an ideal operation for *eration* of the knee joint would consist, broadly speaking, of opening the joint by such incisions as render free access to every part of its interior. Every fragment of unhealthy synovial tissue must be carefully removed. Diseased cartilage is to be pared away and any carious bone removed with a gouge. After this the limb is fixed upon a splint, and the bone ends sutured or not, according to the fancy of the operator.

It is obvious that if the bone ends are much diseased, the removal of this will bring the case into the category of excision. And it must sometimes happen that when a joint is opened more disease is found than was at first suspected. If in such a case the operator holds to his original intention of *eration*, he will probably fail to remove all the mischief and the case will do badly. Doubtless the reader will remember that in a considerable number of cases “movable” joints are declared to result. He will, with justice exclaim that recovery with a freely movable joint would be out of the question, were such extensive operative proceedings carried out on the ligaments and articular surfaces of the bones. But here I must candidly confess my inability to strictly define what case, or class of cases is suitable for such operative measures as would remove serious disease from joint structures, and yet leave them in such a condition as not to impair their integrity or diminish their future usefulness. I must not say that such cases do not occur, for surgeons of repute state that they have experienced them. I have been informed privately by more than one operator, that they have been both pleased and surprised at the movements remaining in a knee joint after *eration*.

Individual experience of this operation and its results must

generally be limited. This may serve as an apology for the fact that I have never seen a case of a freely movable joint, in the sense of flexion and extension after the operation of erosion. I have, indeed, examined more than one case where this success was claimed. Movement in these undoubtedly occurred, but as the subjects constantly wore posterior splints to prevent permanent contractures, it is difficult to understand how the results could be considered more advantageous to them than bony ankylosis. Chronic flexion is only too apt to occur after all operations upon the knee joint. Practical surgeons know how difficult it is to combat, and how, especially among the poor, it may supervene many months after the discharge of the patient from the hospital, and spoil the best operative effects. A very considerable time must elapse before an operator can assert that a case of excision or erosion of the knee is thoroughly successful. I am, of course, now speaking entirely of cases of extensive operation, as erosion of the knee joint. We have all witnessed cases of complete restoration of normal movement in knee joints, the seat of purulent synovitis, which has been promptly drained, under strict antisepsis. But in these cases the joint structures are left largely intact. They cannot be compared to instances where synovial membranes, cartilages and ligaments are cut or scraped away in their entirety. So far as my own observation and experience will allow me to pronounce upon this difficult and debatable point, mobility should only be aimed at in cases where the joint surfaces, and especially the crucial ligaments are left intact. Thus the list must be a limited one.

I cannot but regard many of the untoward results that have followed the operation of erosion of the knee as due to creditable, but ill-advised attempts at the restoration of movement in joints disorganized beyond hope of repair, either by disease or the operative methods required for its removal.

Let us now glance at the published accounts of the operation. Our leading text books do not mention it. One of the most recent writers on joint affections, though he refers to the drainage of joints, and speaks more markedly than many authors of the disadvantages which attend excision, yet makes no mention of the process of erosion as a formal operation. He

hints at it, however. "When the joint is the seat of tedious suppuration it may be opened by free lateral incisions, the diseased synovial membranes scraped away or removed with scissors, and drainage secured, the wound being then dressed antiseptically and the limb maintained at rest upon a splint. I have seen many instances in which this method has been attended with success. It is, however, a proceeding that may seriously tax the general strength, especially in the case of a young child, or of a patient who is already in a condition of exhaustion. It is most suitable for cases in which, though the synovial membrane is extensively diseased, suppuration is not profuse, nor the inflammatory process acute, and in which the patient is above the age of three or four, and not injured in his general condition."¹

Eugene Vincent writing in Ashurst's *Encyclopædia* speaks as follows: "Scraping out a joint (arthrosuesis) does not deserve the credit which has been attached to it of late, no matter in what way it is performed. In fact, if it is practiced by passing the sharp curette through the fistulous tracks or through incisions which do not expose the whole of the joint it is insufficient."²

As most writers are either silent on the matter or refer to it but cursorily, we must estimate the value of the operation, its comparative advantages and method of performance, from experience, published accounts of cases, and theoretical consideration.

My own experience is limited to three cases—one of these, in which the bones were sutured, is eminently satisfactory, the other two were disastrous, the one boy dying of acute tuberculosis before the wound had soundly healed, the other having to submit to amputation on account of chronic flexion of the limb.

In the *Medical Chronicle* of July, 1885, Wright gives the result of sixteen cases in which he has operated. In his method of operating he lays special stress on clearing away all the diseased synovial membrane, especially at the back of the joint.

¹Marsh. Diseases of the Joints, p. 115.

²Article in Ashurst's *Encyclopædia*. Eugene Vincent, M. D.

The limb was afterwards treated by a back splint. No mention of suture of the bones is made. The results he quotes are worthy of note. Of sixteen cases :—

One recovered with a movable and painless joint.

Six recovered with sound and useful joints, though in some of these there was bending.

Two are claimed as partial successes.

Five required secondary amputation or excision.

Two died of intercurrent conditions.

The cases which ended satisfactorily were marked by the following common conditions : Absence of suppuration, superficial bone disease, absence of general tuberculosis. This author arrives at the conclusion that seven of his cases ended with as good a result as excision and without shortening. On close examination of the table given below we cannot quite agree with this statements.

Wright's cases of Arthrectomy. *Med. Chronicle*, July 1885.

1. A moveable joint.

2. No shortening, but the limb tends to become flexed if it is not supported by apparatus.

3. Did not do well, and joint was afterwards excised. Ultimately a firm, straight limb resulted.

4. Erosion, failure, disease too extensive, amputation five days after.

5. A sinus persisted in the knee, and she died of spinal caries and phthisis.

6. Erosion performed in 1882. In 1885 there was a tendency to flexion, if limb was left unsupported.

7. Excision afterwards, and then amputation.

8. Amputation of thigh.

9. Wound did not heal soundly, death from suppuration.

10. Amputation, as wound did not heal.

11. Recovered with slight flexion. Erosion performed in 1884, in 1885 was wearing a Thomas' splint.

12. Sound and well. No shortening.

13. Erosion December, 1884. May, 1885—not quite healed but promises well.

14. Erosion, January, 1884. May, 1885—Not yet healed.

Condition of knee not very good. Some flexion. Neglected at home.

15. Healed entirely. After result not given.

16. Erasion May 25th, 1883. April, 1885—sound and well, but still wearing a splint.

Before taking leave of the consideration of this list it must be remembered that these are among the earlier cases of operation. And there can be little doubt that a similar list of cases by the same operator in the present day would show far better results. Indeed I have had private information from a Metropolitan Hospital surgeon, stating that of late the results of arthrectomy of the knee in his own practice and that of a colleague have been highly satisfactory. Whether this may be due to more careful and intelligent selection of the cases suitable for operation, to methods of performance, or after treatment, I cannot say, though I suspect and am of opinion, that the first and last of these factors are the most powerful agents in the satisfactory result alluded to.

In discussing the merits and disadvantages of the operation of erasion of the knee from an argumentative and theoretical point of view, I shall be as brief as is consistent with clearness of expression. If arthrectomy be limited to the removal of the diseased synovial membranes only, the articular surfaces and ligaments being left intact, it is obvious that the number of cases in which the operation is justifiable or admissible, must be strictly limited to cases of pure synovial disease. Many of these may be treated by milder measures than those of operation. In this strict sense, the number of cases in which erasion is justifiable, are few and far between. But if, as appears to be more commonly the case, diseased cartilage is shaved away from the bone-ends, and suspicious or obviously diseased portions of osseous tissue scooped out with gouge and osteotrite, it is fair to state that the operation is really one of modified excision. It is in this latter sense that I would especially discuss and regard it. But then it will be asked, in what way does this proceeding claim superior advantage to excision? I would reply, that in excision the cut surfaces of bone are larger and the reparative process more severely taxed. The subsequent growth of bone is interfered with, and

the operation is often more extensive than the local disease demands. Time and space forbid one writing in detail on the class of cases for which this operation is justifiable. On referring to the remarks of Wright given above, it will be seen that he mentions certain factors, as conducive to success, and I do not know that more reliable guides than these could be found. Prominent, is the question of general tuberculosis and suppuration about the joint, with sinuses and bone disease. When these are present, it is generally held that extensive operations are inadmissible. Yet how diverse are the opinions held on this point may be gathered from the remarks of a recent surgical author. "In cases of advanced tubercular disease, ankylosis of the joint may result if the parts are freely laid open, the granulation tissue broken down, and efficient drainage established, the limb being kept at perfect rest."¹

But it is certain that great care and discrimination must be exercised before determining upon operation. Speaking generally there are few surgeons who would confidently predict the exact condition of the interior of a joint without opening it. When they have done so they may find local conditions, which may lead them to modify their previously formed ideas of operation. So too it is quite easy, even when a joint is opened, to mistake superficial for deeply seated bone disease, and either to remove a needless amount of osseous tissue, or to leave behind foci of disease, which are sure to lead to future troubles. Mayo Robson, writing in the *Lancet* of January, 16th 1886, on this subject, speaks as follows:—"My friend, Mr. Ward, was excising a knee-joint on account of disease which appeared to be limited to synovial membrane, the articular cartilage and bones being apparently healthy. On examining the excised end of the femur a nodule of tuberculous granulations as large as a pea was found beneath the cartilage. Now, if this joint had been erased instead of excised, the probability is, that the disease would have returned, necessitating excision or amputation." "Arthrectomy is still on its trial, and is not by any means a well established operation."

Having thus briefly glanced at the scope of the operation,

¹Macnamara. Diseases of the Bones, p. 346.

the class of cases in which it should be recommended, and the circumspection with which the prudent surgeon should decide upon its adoption, we now naturally have to consider its actual performance. Whether strict Listerism be followed or no, will depend upon the peculiarities of the operator. Strict cleanliness is most essential, and antiseptic fluids, especially the perchloride of mercury lotion, are advantageously employed. Esmarch's bandage in these cases causes troublesome after-oozing. The limb can be rendered moderately exsanguine by elevation and the application of a roller bandage. The stages of operation are as follows.

1. *Opening the joint.*—Much discussion has arisen on this point. What incisions give us the best view of the interior of the joint, and yet interfere least with the soft parts around? Putting aside the position of sinuses or other local conditions which might modify the nature of the incisions, we find that the following methods are most generally adopted:—The anterior horse-shoe shaped incision dividing the ligamentum patellæ; Lateral incisions at the same or different levels; Division of the patella both longitudinal and transverse. Doubtless the ingenuity of operators might easily extend this list. Yet if a firm, straight, ankylosed limb is to be aimed at, it seems very immaterial which of these are adopted, provided that the soft parts round the joint are not unduly divided, and free access to the joint easily obtained. The advocates for division of the patella lay great stress on the assertion, that if the anterior ligament be intact, it prevents the slipping back of the tibia so apt to occur after operations on the knee. Now it is the crucial ligaments which form the chief bond of union between the femur and tibia. When they are destroyed by disease, any practical surgeon will know how impotent is the anterior ligament to prevent backward displacement. Again, disease may be left in the patella, or the saw, in passing through a delicate cancellous bone, may originate inflammatory mischief and subsequent caries. That this is no fanciful objection, may be elucidated by the inspection of a specimen in the Museum of St. George's Hospital, prepared by myself when Pathologist to that Institution: it shews a patella removed for caries after 'trans-patellar' excision of the

knee. If the case be limited to disease of the synovial membranes, and a surgeon should be desirous of obtaining movement, lateral incisions, as advocated long ago by Treves, of Margate, will give us free access to the under surface of the patella, and the interior of a joint. I have verified this by operations on the cadaver. But in the majority of cases I feel sure that the anterior incision is the best, and here it may be observed that it is by no means needful to make this so inordinately extensive, as to leave the leg attached to the thigh by only the popliteal vessels and the ham-string tendons. All that is needed is an incision which permits of free inspection and treatment of the whole joint easily. The divided patellar ligament can be sutured with cat-gut, so that the action of the quadriceps in aiding the forward movement be not lost.

2. *The removal of diseased structures.*—No time and pains must be spared in order that this be thoroughly performed. The extent to which ligament and cartilage may be left intact, will vary with the amount of disease present. Yet if there be but so little disease as to permit of the retention of the crucial ligaments, and the cartilages, the case might have done well under other than operative measures? Diseased cartilages must be pared away, spots of carious, or softened bone carefully gouged out. It is hardly needful in this communication to dwell upon the importance of completely eradicating every particle of diseased synovial membrane. Masses of this tissue are apt to escape detection near the posterior part of the joint, or in the plications of the membrane beneath the vasti muscles. The bleeding should be quite arrested by ligature, and the application of hot iodized sponges.

3. *The fixation of the limb and suturing of the bones.*—It may be aptly remarked here, that the greatest essential to union of wounds generally, more especially of osseous tissue, is complete rest with absolute apposition and fixation of the parts implicated. This is especially true of fractures, it is equally binding in the after-treatment of operations, when bony or cartilaginous surfaces have been divided. I believe that many of the unsatisfactory results that are seen after operations on the knee when bony ankylosis is aimed at by the surgeon, are due to neglect or incomplete performance of these

two principles. There is such a vast difference between complete and incomplete rest. There is a striking contrast between complete and partial apposition. The careless and unscientific surgeon places the limb upon an ill-fitting splint, and has it so secured that every start of the muscles, causes the bone-ends to heave under the flaps. A drainage-tube, lies between the bone-surfaces. The wound must be frequently dressed, and unless the splint be especially fashioned, the limb has to be moved every other day for the purpose of dressing and cleanliness. This necessitates still further movement of the bone ends. Fungous granulations spring up, profuse discharge ensues, the patient's strength is exhausted, and amputation of the limb is finally resorted to. Occasionally the powers of nature triumph over the imperfect surgical treatment and a good result ensues in spite of it. But such a consummation cannot always occur. Although these remarks apply to excision of the knee, they equally apply to cases of erosion, where bony ankylosis is aimed at. Seeing then that absolute fixation of the joint surfaces is so essential to a good result, we must briefly consider how this is best to be carried out. The splints should be interrupted at the knee, so that the wound may be dressed, and yet the limb not moved. The posterior splint should embrace both thigh and leg, from the groin to the foot. A foot-piece should be fixed upon it, to prevent weakness of the ankle joint from stretching of the ligaments and want of support. This splint should be a little curved, to favor ankylosis in the slightly flexed position. No better plan has ever been adopted for fixing the bone-ends in apposition than that of pegging or wiring them together, as recommended by Baker and others. The ordinary mechanical dexterity which should be possessed by any one who pretends to be an operating surgeon, will enable the operator to do this with such complete success, that the limb may be raised from the table, as soon as the wires are tightened, and no appreciable movement be discerned between bone ends. Thus even if the integrity of the anterior ligament be essential to prevent displacement, which I have already seen reason to doubt, its supposed function is not needed.

The patella had better be removed, if at all diseased : other-

wise its surface can be refreshed, and it will ankylose firmly to the front of the femur. The wound may now be united accurately, and if the oozing of blood has been thoroughly checked, there will be no reason that a tube should be employed. When the operation is conducted on these lines, the surgeon has good reason to be surprised if an unfavorable result should ensue. Great care should be taken that the uniting medium, at first fibrous and afterwards osseous, does not yield. Eighteen months may be taken as a fair average period during which artificial support should be employed.

A last and important plea for bony ankylosis in cases of operation in the knee joint may here be dealt with. It is well known that the majority of these operations on the knee are performed upon the children of the poor, or of the so-called working classes, who are unable to afford the means and luxuries so essential in the treatment of chronic joint disease. Years of rest and treatment, changes of air, elaborate splinting, are only at the command of the wealthy. If after operation the child is sent to a poor home, with imperfect union, disaster will surely occur. The surgeon will find to his chagrin, that the limb which perhaps had been exhibited triumphantly before a Medical Society, has now become hopelessly deformed. When he enquires for the elaborate splint, the daily application of which he enjoined, he finds that it has been thrown by, or parted with for some commodity of life, at the nearest pawnbroker's. No stronger argument could be adduced for the importance of wiring the bones, and causing osseous ankylosis before the child is lost sight of.

It is now doubtless obvious to the reader, that the operation of erosion of the knee differs from excision mainly in the more limited operative dealings with the bone ends. In excision a large lamina of bone is removed, in erosion the diseased tissue is gouged away. In the first, growth is apt to be arrested, in the second it should not be interfered with.

In September, 1886, I amputated the limb of a sailor on account of bony ankylosis of the knee in bad position, the result of suppurative arthritis twelve months before. The joint surfaces were united by two buttresses of bone which passed from the trochlear surfaces of the femur to the tibia. These were

about the thickness of a man's thumb, and were composed of firm and dense bone. The cartilages had disappeared, and a loose filamentous tissue occupied the interstices of the joint. Had the parts been kept straight, no union could have been firmer or more satisfactory. Thus it would seem that if the opposed surfaces of the femur and tibia are refreshed and united by wire, sufficient osseous substance may be produced to maintain firm union.

It seems that with care in the selection of cases, and especially in the performance of the operation and after treatment, that the proceeding known as erosion of the knee has a promising future before it, and may, in time, be recognized among the more satisfactory operations of conservative surgery.

ON THE ETIOLOGY AND ESSENTIAL NATURE OF SCOLIOSIS.

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THERE have been no thorough and elaborate investigations of the essential nature of scoliosis, which can compare with those of Miculicz into the pathology of genu valgum. But the points of resemblance between true lateral curvature and knock-knee are so strong that one is almost compelled to recognize in the known facts about the latter, the key to the true pathology of the former.

Fig 1 represents diagrammatically, a transverse, perpendicular section of the body of a vertebra in one of the curves of a scoliotic spine. It is wedge-shaped, with the apex of the wedge towards the concavity of the curve. There has evidently been inequality of development on the two sides of the main bony mass of the vertebra, analogous to the inequality in growth of the two sides of the diaphysis of the femur. (see Fig 2.)

The epiphyses are developed unequally in the same way. Just as in knock-knee the result is an angular curvation with the apex towards that side on which the bone has grown the faster, so in scoliosis, we have a lateral curvature with the convexity towards the side on which the vertebral bodies have grown the faster. However, in the latter case, the curvature is not angular but rounded, in consequence of a row of superimposed bones being similarly affected.

A number of wedges with straight sides can as, everybody knows, be arranged to form together a curved line, as in Fig 3, every single line of which is straight, but the whole produces an arc.

To see these facts in their true light it is necessary to realize that *more or less of this osseous deformity, of this wedge shaped alteration in the vertebral bodies, exists at the very first onset of the disease.* It is present in those cases of scoliosis which are only recognizable by the existence of the slightest possible



Fig. 1.



Fig. 2.



Fig. 3.

degree of projection of one shoulder-blade, or of one hip. It has been found in every specimen of scoliosis, mild or severe, in every museum in the world in which it has been looked for. It has been found to exist in a marked degree in specimens in which it has been declared to be absent, by surgeons who believe in such a thing as scoliosis of a muscular and ligamentous origin. Take, *v. g.*; specimen No. 521, of the Musée Dupuytren. Bouland has given careful and conclusive measurements of the asymmetry of the bones of this specimen, thus refuting statements of no less a surgeon than Malgaigne.

It may be said, in fact it has been said, that these osseous changes are the results of the continuance of a lateral curvation produced by other causes.

I have already pointed out that they exist from the very first ; therefore the influence of the other causes on the shapes of the bones must be practically instantaneous. Let us consider what these other causes are said to be, and then try if they can do what they are credited with.

1st. We are constantly told that faulty positions, if habitual, will produce scoliosis. And among the chief agencies which produce these habitually wrong positions the greatest stress is laid on (1) muscular weakness, (2) inequality in length of the lower limbs. (3) the practice of carrying weights on one shoulder or one arm. With regard to muscular weakness, it does not exist in a very marked degree at the onset of scoliosis. In many cases it does not exist at all ; on the contrary considerable and even exceptional muscular vigor is occasionally coincident with progressing lateral curvature, and, which is more to the point, it has never yet been shewn that such weakness as is sometimes found is not the result rather than the cause of the disease. By "the disease," I do not mean the deformity, but the essential disorder which possibly exists and causes both the deformity and the muscular weakness. Moreover, let us remember the countless number of instances of great and prolonged muscular weakness which everybody may see absolutely uncomplicated with deformity of the spine. How small is the proportion even of young people, who when convalescent from fevers or whilst exhausted with long chronic illness, or who from congenital want of vigor have to crawl feebly through life, how small is the proportion of such in whom true scoliosis may be detected. Perhaps it may be urged that this is merely because some exciting cause is wanting. But what are the exciting causes most favored by the muscular-mechanical theorists ? They are inequality in the length of the lower limbs, and habits of lazy or sidelong sitting, standing, and the like.

Now the class of weak young people I have just referred to, is crowded with individuals who from hip or knee disease habitually walk and even sit with a laterally curved spine ; it is crowded also with persons who are clerks, pupil-teachers and the like, because they are fit for nothing which makes greater demands on the physical strength. It is crowded with

seamstresses and machinists who habitually sit to one side, with shop-girls who are always reaching up to high shelves with the right hand, or standing at ease on one leg; yet it would be a monstrous and palpable misstatement to say that any but a small minority of these people are scoliotic.

It may be replied "exactly so, it is only persons who are subject to an *excess* of the influences in question who get lateral curvature." This statement is as baseless as the rest. There happens to be a class of so-called "hysterical" people, who will loll all day long for years with their backs arched sideways almost to a semicircle, fancying they have lateral curvature, and frequently encouraged in this fancy by mistaken medical men. Often these young women have very weak muscles. But it is the rare exception for anything like genuine scoliosis with its osseous deformity to supervene. Now how could any mere statical arrangement be devised more favorable for putting to the test the theory I am attacking, than that a weakly young woman should keep up for hours, days, and years, (at least when observed), a position like that just noticed?

Then again, with regard to inequality of the lower limbs, long series of cases come under my observation, of persons with one leg, three, four, five, six, seven, etc., inches shorter than the other, usually from disease, sometimes from congenital peculiarity, and it is rare indeed to find one of them with scoliosis. In most of these cases, the inequality has existed for years at the very age at which scoliosis usually develops.

Lastly with regard to carrying and lifting weights almost exclusively with one arm, who is there who works at all, whether scoliotic or not, who does not use one arm more than the other? When we are told that a certain nurse-maid contracted lateral curvature from always carrying the child on one arm, let us ask ourselves have we any reason whatever to assert or think that non-scoliotic nursemaids are free from any partiality for one arm or the other. How many young blacksmiths become scoliotic from using, as they do, the small hammer, almost exclusively with the right hand? It has been said that their muscular development protects them. But it does not protect them from knock-knee and flat-foot. And, indeed, they do occasionally have lateral curvature like other people,

but only like other people. Let us remember also that the young women who form the largest proportion of scoliotics are not given to using either arm very much.

2nd. Lateral curvature has been attributed to an absence of balance between the strength of the muscles acting on opposite sides of the spine.

Now, in an ordinary case, the most careful examination will fail to detect any sign of such an inequality. And, moreover, in the rare cases where such an inequality undoubtedly exists, namely in cases of hemiplegia, it is not usual for lateral curvature to supervene, or it may supervene but in the opposite direction to that in which it should occur according to this the so called "antagonistic theory." Moreover, although it is impossible to find any noticeable asymmetry as regards the muscular strength of the trunk, we may, as the parts of the body are scarcely ever perfectly symmetrical, be sure that some degree is almost always present in non-scoliotic as well as in scoliotic persons.

In short, no mere mechanical or muscular theory will account for scoliosis as we ordinarily meet with it. We must not allow ourselves to be misled by any teaching of the kind, if we are ever to get at the true etiology and pathology of the disease.

Upon reflection we are struck with several facts which may not improbably have, individually or collectively, an important bearing on the question. In the first place the deformity begins almost always either during early childhood or between the ages of eight and sixteen or seventeen. In the former case its rachitic origin is undoubted. In the latter case it commences at a time of life marked by the approach or onset of puberty, the very great majority of the persons attacked are females. Putting aside for the moment the difficult question of the real or imagined relations between syphilis and rickets, the latter may be described as a disease of nutrition and growth of the osseous system. It will be granted also that the nature and amount of the food have a great influence on the course of rickets, even if faults in the matter of diet are not wholly responsible for its onset. I am not acquainted with any inquiry, if such have ever been made, into the dietetic habits of adolescents with lateral curvature.

It would be worth making, though perhaps difficult. Young girls of the upper and middle classes, who furnish so large a relative proportion of scoliotics are certainly given, for æsthetic and fashionable reasons, to playing tricks with their diet, to eating irregularly, even if not insufficiently, and especially to the avoidance of what they are pleased to consider coarse feeding.

It is not impossible that in their anxiety about their skins, they may unwittingly starve their bones. It is not, however necessary to detect error in what actually enters the stomachs of adolescent scoliotics. Nutrition being a very compound function, it may be said that not only is there many a slip 'twixt the cup and the lip, but there are many more between the lip and the blood. Now a disordered nervous, especially a troubled vaso-motor, system is particularly likely to cause slips of the latter kind, that is to say prevent even the best of food from building up sound blood, bone, and other tissues.

Puberty and the few years which precede and follow it constitute the time of all others when such nutritive disorders such nervous troubles are rife. They show themselves superficially in the form of cold extremities, of chilblains, of acne-covered faces and backs, of lusterless hair, of wet palms and soles, of chlorosis, and of some of the well known signs of of mental and spiritual discomfort characteristic of the hobbled-hoy, and of the bread-and-butter Miss. I am speaking of these as "superficial" symptoms, but they are obviously significant of profounder changes. When the gums are chlorotic the lungs are not less so.

When the circulation in the feet swerves at the slightest provocation from the even tenor of its way, it may be just as irresolute in the liver, or the kidneys. All this points to the probability of disordered nutrition of the bones, the parts primarily affected in true scoliosis, being of the very essence of the disease. But, having got so far, we are still far indeed from complete knowledge. Why do only a limited number of wrongly fed infants get rickets? Why do only a small proportion of young people at or near puberty suffer from disordered nutrition of the bones?

The whole answer to these questions has yet to be worked out. Various guesses have been made ; but mere guesses they still remain. It would be strange if masturbation, the universal scapegoat for the pathological errors of adolescence, had not been pitched upon. Accordingly we find that Mr. Clement Lucas, has scarcely a doubt upon the point. In his eyes the knock-knee, and the scoliotic back appearing about puberty, are as pathognomonic as the shame-faced glance, the dull eye, the spiritless manner, and the other little signs that together make up a picture which, it cannot be denied, all who run may read. But when one comes to examine either Mr. Lucas's argument, or Dr. Moxon's paper, to which he refers us, we see that it is but guessing again, and that all the difficulties of a most difficult question are simply evaded. For instance, let each of my readers run over in his own mind the number of persons whom he *knows* to have been guilty of self-abuse, and then ask himself how many have lateral curvature or knock-knee? Even as I write this, I pause and, without an effort, recall more than twenty, who have confessed to an excessive addiction to the practice throughout youth, and every one is straight in trunk and limb, excepting a case or two of slight kyphosis.

But we know that the vice in question is even more common among the poor than among the rich, and quite as common among young boys as among young girls. How do these facts fall in with the proportionate liability of these classes to scoliosis? Nevertheless, the mere fact that a grave vice, well known to be capable of seriously impairing nutrition, is most common at the age at which the rickets of adolescents occurs, is to be well remembered in the study of the affection.

A cause may be a true cause and yet act only exceptionally. For instance, masturbation is an undoubted cause of insanity, but only in the case of a small proportion of offenders. On the other hand lateral curvature is frequently seen commencing in young people with frank, innocent bright looks practically beyond suspicion. Many such are not more than five, ten, or twelve years of age. To sum up, the essential nature and causes of scoliosis are not known with certainty and invite inquiry. But facts point very strongly towards the probability of a disturbed nutrition of the ossifying cartilages and of the

bones of the spine being a necessary factor in the production, and this disturbed nutrition is not secondary to any such coarse mechanical influence as, for example, a habit of sitting or standing with the spine arched sideways.

Next we have to ask ourselves, do such mechanical influences as those I have just mentioned play any part in the etiology, and, if they do, *what* part?

Once again let us try to realize how utterly unscientific is the practice of saying, "so-and-so used to carry a heavy bag with one hand or to regularly practice on the violin, and consequently he got a lateral curvature of the spine." How surgeons can write and talk like this when any evening they may go to a theatre and see a dozen straight-backed musicians who have all fiddled away for their daily bread from their boyhood upwards, is really astonishing.

But this slipshod style of inference is not necessary to prove that statical forces do, almost certainly, play a part in the causation of scoliosis.

In almost every instance of this deformity there is more than one curve in the spine. And the successive curves always alternate. See Fig. 4. Now if the affection were purely one of defective nutrition, or other form of tissue-disease, it would be in the highest degree unlikely that the vertebræ most affected, most altered in shape, namely those at A, B and



Fig. 4.

C, would always be found to occur in alternating sets, thinned first on the left side, then on the right, and so on. We seek in vain for any anatomical facts to explain the regular alternation, and when it is remembered that the positions of the different curves vary almost infinitely in different cases, it is clear that a mere anatomical explanation is not very likely to be possible. On the other hand the statics of the spine give a reason at once ready, satisfactory, and not inconsistent with what else is known about the matter. We shall return to this subject when writing of secondary or "compensatory" curves. In genu valgum, a compensatory and secondary curve inwards of the ankle takes place. It brings the foot flat to the ground. Now comes the question, *what* part do statical forces play?

Do they deserve to rank with the rachitic affection itself, are they more important or quite subordinate? This question has a distinct bearing on practice, as we shall see by and by.

I am scarcely inclined to go with Professor Bush, of Berlin, who writes of the rachitis as a mere predisponent and of the statical or "pressure" forces as the causes. The latter are so common, in fact they are universally existent in some degree, and yet it is seldom that they produce scoliosis. On the other hand does rachitis of the adolescent spine ever exist without causing scoliosis? That is a difficult question to answer in the negative, but it is enough for my argument, that it is equally difficult to answer in the affirmative. When an ill made pudding falls in pieces, we do not blame the universal force of gravity. We fix our attention on the faulty preparation of the pudding.

That statics play a part in determining the direction of each curve may be regarded as certain, that they play a part in fixing the position of the center of each curve is almost equally certain, that they have a great deal to do with regulating the intensity of each curve is likely enough, but by no means certain. Before passing to simple anatomical description a few other points should be noticed bearing on etiology.

I have mentioned already the ages at which scoliosis usually supervenes, namely (1) early childhood; first to fourth or fifth year. (2) eighth to fourteenth year or later, (3) after the fiftieth year. The last class of cases rarely actually originate in advanced life. But they may have been stationary throughout the prime of life, and, in old age, commence to get worse.

Such cases are usually complicated with kyphosis, sometimes to a very marked degree. With regard to sex, in early childhood, the proportions are always equal. In adolescence and old age the females greatly outnumber the males, (5 or 6 to 1.) This fact suggests a relationship of the cause of scoliosis to the sexual changes about this period far more impressive in the female than in the male organism. On the other hand it does not suggest a special connection between scoliosis and moral vice of a certain kind.

The various influences which may injure the constitution during infancy and youth act at least indirectly as causes of scoliosis by predisposing to or actually producing rachitis either of infants or adolescents, and possibly in other ways.

It is not uncommon to find more than one case of scoliosis

in the same family. I occasionally see three sisters all scoliotic, and with a considerable degree of kyphosis. There appears therefore to be, at least, an occasional hereditary tendency to scoliosis.

Cases of scoliosis occur in which the mechanical origin is beyond doubt; but they are rare; and such as I have seen present marked differences from ordinary scoliosis. Among such mechanical causes are cicatricial bands, injuries to the spine, the pressure of tumors, and contraction of one side of the thorax consequent on empyema. I know personally of no case of lateral deformity of the spine due to any of these causes, except cicatricial contraction after burns of the neck and lateral curvature after empyema. Even when powerful mechanical influences such as the above act, the deformity only exceptionally assumes a form similar to that of true scoliosis. Lateral inclination of the spine starting at the point of disease, is not uncommon in cases of caries, especially lumbar caries. The statical inclinations which play a certain though limited part in the etiology of scoliosis may be referred to two classes of influences, namely (A) Those which disturb directly the equilibrium of the body above the pelvis, and (B) those which directly raise or lower one side of the pelvis above the other side.

Class (A) includes the loss of one arm, inequality of the arms, paralysis of one arm, (causing it to hang like a dead weight,) alteration in the size of one or more of the viscera, and development of a tumor laterally. Class (B) is for practical purposes confined to deformities, deficiencies, etc., of the lower limb or limbs.

It includes amputations, dislocations, permanent flexions, anchyloses, arrested development, club foot, paralyses, unsymmetrical rachitic curves, and the like.

It should not be forgotten that scoliosis occurs in animals, such as the horse, which walk on all fours, and also in fishes. A scoliotic gold fish was to be seen swimming in a bowl for some years, up to the present (1887) in the "male accident-"ward at the West London. Cases have been recorded in which scoliosis appeared to have had a rheumatic origin. Among attitudes and actions favorable to the development of scolio-

sis have been enumerated carrying weights always on one arm, working excessively with one arm or one leg, harp-playing, fiddling, embroidering and sewing with machines, writing and drawing.

I hope that the appeal which I have already made to my reader's common-sense will have prepared him to endorse what Bouvier and Bouland have to say about these occupations. "The influence of these on young girls has been much exaggerated.

It is only in particular cases and when they have been pushed to extremes, that they appear to really concur in the production of scoliosis." Mark the caution of the expression, "*they appear to really concur*, in the production," not "*they produce*."

The etiology of congenital scoliosis is quite special, and all the above remarks apply to it, little if at all. It is associated with other grave defects constituting a peculiar kind of monstrosity.

EDITORIAL ARTICLES.

RECENT CONTRIBUTIONS TO RECTAL SURGERY.

1. *B. Bardenheuer.* Die Resektion des Mastdarmes, Volkmann's klinische Vorträge. No. 298. (Resection of the Rectum).

3. *K. Schuchardt.* Ueber die tuberculose Mastdarmfistel. Volkmann's klinische Vorträge. No. 296. (On tuberculous fistula in ano).

3. *F. Esmarch.* Die Krankheiten des Mastdarmes und des Afters. Deutsche Chirurgie. Lieferung 48. (Diseases of the Rectum and Anus).

1. The great advances made of late years in the subject of rectal ailments and the enlargement of the field of operative interference are undoubtedly unprecedented in the history of these diseases. More especially, in the immediate past, the major operations on the rectum have been assiduously held forth by German surgeons, on the one hand, and have suffered severe attacks from France and England on the other. Even, if we somewhat doubt that these operations will ever enjoy a sphere of usefulness comparable to those of ovariectomy or hysterectomy, or more correctly, that a similar revolution of medical opinion in their favor, based upon similar achievements, will ever take place, as is the fond hope of Prof. Esmarch, we do not for a moment doubt that a general advance in the diagnosis, for instance, of malignant disease of the rectum and its early operative treatment will be fraught with perhaps less brilliant, but equally beneficial results to suffering humanity. The contributions we are about to review have assisted, and will furthermore assist in such progress, especially the work of Esmarch, from whose pen we always expect a happy combination of scientific treatment of the subject with eminently practical suggestions, in which expectations we are again not disappointed. Considering also the great practical value of Bardenheuer's clinical essay, a more extended review may not be unwelcome to our readers, more so as the first edition of Esmarch's work in Pitha-Billroth's Handbook has not been noticed in these pages heretofore.

Bardenheuer distinguishes between amputation, extirpation and resection of the rectum, the first two including the removal of the anal portion, the term extirpation being reserved for removal of the entire rectum with part of the colon. One of the principal objects of B.'s monograph is to enlarge the field of resection of the rectum, for which operation amputation has been too frequently performed. At the onset B. emphasizes that the reflection of the peritoneum in Douglas's pouch and the plica vesico-rectalis s. uterina forms no boundary line of these operations, and in proof of this he mentions that of 20 operations of this kind in his own practice in only one has the peritoneal cavity not been opened. The indications for resections of the rectum are :

1. *Recto-vaginal and rectal fistulæ*, which are amenable to no other surgical procedure ; the size of the defect, the kinking of the rectum, the firm adhesions of the same to the pelvic wall by the cicatricial tissue around the fistula, the formation in such cases of a valve immediately above the seat of the fistula, are the pathological features that urge on us radical operative interference.

2. *Stricture of the Rectum*.—B. has operated 3 times in cases where rectal bougies and incisions of the stricture, had proved ineffectual in a treatment of years. Colotomy had been proposed, but B. was able to get an excellent result in each case. It is, however, granted that in these cases resection is a somewhat dangerous proceeding, on account of the coexisting inflammatory infiltration of the surrounding tissues, since traction may give rise to fatal hemorrhage, as happened in another of B.'s cases

3. *Carcinoma of the Rectum*—This forms by far the most frequent indication for resection. Carcinomata of the rectum, generally, form adhesions with the prostate gland before reaching the bladder ; the latter organ, the ureters, and the peritoneum being simply raised by the tumor and consequently easily detached from it during operation. If, therefore, the prostate is freely movable without the tumor, one may expect to find no adhesions with the bladder, etc. ; but then only firm adhesions to the pelvic walls are an absolute counter-indication to resection. Unfortunately, the diagnosis of carcinoma is generally not a

very difficult one, as the disease is pretty far advanced when medical advice is sought. It is, therefore, of paramount importance in all cases of rectal trouble, even if no other symptoms than constipation with occasional diarrhea prevail, to make a thorough digital exploration. It is occasionally difficult to distinguish between carcinoma and stricture from infiltration and ulceration. In the latter instance the narrowing is generally more pronounced, the path of the stricture straight and not tortuous as in carcinoma, nor interrupted by knotty protuberances. There are, furthermore, wanting deep ulcerations in tissues that break down under the finger, and the general condition of the patient does not warrant the diagnosis of carcinoma. Although resection and amputation are universally acknowledged operations in Germany, B. would even extend the domain of rectal surgery beyond the limits generally set down by German surgeons, and only demands a certain mobility of the entire tumor-mass, even if the neoplasm has invaded the surrounding tissues or is situated high up in the sigmoid flexure. B. has resected 20 to 40 cmtr. of gut. The favourable prognosis after successful removal of cancer of the rectum is an established fact, and B. from his statistics believes that the mortality from the operation can eventually be reduced to 5%, barring complicated cases in which, for instance, the bladder has been opened. The great dangers of the operation are shock and sepsis. It is therefore incumbent on us to prevent any unnecessary loss of blood, to operate as quickly as possible, to secure efficient drainage, and to avoid gangrene of the lower end of the colon, which now and then results from the tension caused by the union of the divided ends of the bowel. The methods of amputation and resection as advocated by B. contain many original points, and being based on a large personal experience ought to command the attention of all who venture on such operations. The patient is prepared in the usual way with laxatives and antiseptic enemata. The operation is performed in the breech-back position, with the buttocks slightly elevated.

An incision is made through the skin and the superficial fascia, from the posterior border of the anus to the middle of the os sacrum and the soft parts are detached from the posterior aspect of this bone.

The lesser and greater sacro-sciatic ligaments are severed, and the os sacrum transversely divided at about the third sacral vertebra. This allows the entire hand to be introduced into the pelvis. The left index finger is now introduced into the rectum, until the tumour is reached, and the posterior wall of the gut is pressed against the primary incision. This is said to be a very important aid in now cutting down upon the posterior wall of the rectum, and makes this part of the operation almost bloodless. Both indexes are then thrust into the wound, which is widened by tearing apart the tissue in the median line towards the anus as well as the os sacrum. The left index is now reintroduced into the rectum, and the right being guided by the left, detaches all the tissues on the inner aspect of the levator ani muscle, around that part of the rectum situated immediately below the tumor. A loop having been passed around the isolated portion of the rectum and some traction being exerted, the tumor itself is separated from its surroundings in a similar manner; first on its posterior, and then on its anterior aspect, where in many instances the peritoneum can be detached without opening its cavity. Should the latter become a necessity, the cavity is plugged with thymol-gauze, the rectum drawn down and the operation quickly ended. The bowel is divided 4 cmtr. from the upper border of the tumour, and 2 cmtr. from the lower, and finally united by two running sutures, one including the mucous and the other the serous and muscular coats. The wound is filled with iodoform gauze. If the tumour is located near the prostate gland, the primary incision must be carried as far forward as the scrotum, severing the sphincters; the rectal wall is now divided transversely, from the inside below the tumor, and the operation continued as in the first instance. Amputation is, in its main features, carried out alike, after circumcising the anus and continuing the incision posteriorly to the os sacrum. Here, occasionally, so much of the rectum is removed that it becomes a risky proceeding to pull down the stump of the colon to the anal orifice on account of the great tension which is sometimes, as previously stated, followed by gangrene of the gut. In these cases B. advises to suture the colon to the fundus of the bladder. To whom B.'s operations still seem to lack surgical intrepidity a propo-

sal of B. for carcinoma of the sigmoid flexure, not to be reached from an incision at the outlet of the pelvis, will undoubtedly prove the contrary. It is to reach the seat of disease, extraperitoneally, from an incision above the symphysis pubis, to disengage the tumour from the surrounding tissues and then to resect the affected parts, which can now be well drawn down from the perineum. In the interest of the operation, as well as the patient, it is to be hoped that the practical verification of this proposal will be attempted by B. himself. The methods of resection and amputation, as advocated by B., can certainly claim many advantages over those formerly practised, and it is fortunate that the large personal experience of the author allows him to describe them in so precise and therefore faith-inspiring manner. As simple as, for instance, the tearing of the tissues, when once proposed and experimentally proved *in vivo*, now appears to us, we must not forget that by this simple handiness operations of this nature can be performed with but a few ligatures and, at least by B., in 15 or 20 minutes—agreeable news to those who have tasted the bitterness of an extirpation of the rectum with scalpel and scissors, and who have sometimes laboured for hours over the completion of the same. With the favourable prognosis of recurrence and the moderate inconvenience caused by the absence of the sphincter muscles in those cases, in which tumors have invaded the anal portion of the rectum, it is to be hoped that the domain of direct operative interference with the rectum, in preference to colotomy, will be much extended, with the necessary surgical discretion.

2. After quite an interesting brief historical sketch of the various phases, through which our knowledge of tuberculosis has passed during the last centuries, and after calling attention to the fact that medical superstitions among the laity are nothing else than the images of theories, which have been rife in science years before and have, perhaps, long since been overthrown by the exact methods of scientific investigation, through the influence of the late advances in natural sciences, Schuchardt recognises in Koch's discovery of the tubercle bacillus a new era in the history of tuberculosis in general, and of tuberculous fistulæ in ano in particular. But, at the same time, he points out that

v. Volkmann was the first to call attention to the tuberculous nature of certain anal fistulæ, even before the discovery of the bacillus, whereas now it is has become a simple task to diagnose the true nature of such affections, as the microscope will in every case reveal the presence of bacilli, even if only in small numbers and in few specimens. The tissue-structure, either miliary tuberculosis or tuberculous infiltration (giant and epithelioid cells) helps in the diagnosis, and when all the other methods of investigation have failed, inoculation into the anterior chamber of the rabbit's eye often guarantees a sure diagnosis. The morbid changes are, with few exceptions, located in the ischio-rectal space. There exists generally at the onset an internal rectal fistula, developing into a perianal abscess, which again opens in the perineum after many tortuous windings. There exists no tendency towards cicatrization, as in fistulæ with other etiology. Very seldom the abscess sets in with acute symptoms. An interesting case of the kind at the clinic at Halle is related, bearing upon the etiology of lupus, of a person suffering from tuberculous fistula, who developed lupus exfoliations in the immediate vicinity of the cicatrix after the operation of the same. Soon after the lupus had been successfully removed one of the inguinal glands began to swell, which upon removal likewise proved tuberculous. There were no other symptoms of tuberculosis manifest. S. submits that the infection of the gland was due to the lupus, with seems rather plausible when we recollect that carcinomas of the rectum never cause secondary deposits in the inguinal glands, unless they have located in the anal portion of the rectum, or, at least, have developed towards the anus or the integuments around the same. In by far the greater number of cases S. believes that the virus has entered the cellular tissue through some lesion in the mucous membrane of the rectum, although the possibility of a tuberculous abscess developing in those localities without such a lesion is granted. As to the frequency of primary or secondary tuberculosis and fistula S. does not vouchsafe an opinion; it is, however, important to remember that even lupus, and more especially other varieties of localized tuberculosis, are, now and then, the expression of constitutional disturbance. Of course, S. is an energetic advocate of surgical

treatment, of cutting and scraping the fistulæ and removing the granulation tissues with forceps, scissors, scoop, whereupon the cavity is tamponed with iodoform gauze. In a postscriptum the author acknowledges the probable superiority of the operation recently recommended by American surgeons (Jenks, S. Smith and Lange) for simple fistula, but prefers his method in all tuberculous affections.

3. Esmarch's work starts with a very complete compilation of the immense literature on his subject. The latter itself is treated in 13 chapters, very conveniently arranged, and allowing an easy survey of the various forms of rectal ailment. E.'s style is well known not to be verbose, but it is fluent and everywhere to the point. In every chapter we find practical hints, which we might occasionally feel inclined to pass over rapidly, but which after a little consideration, we willingly attempt to commit to memory, because we feel assured that they are of practical value and may prove so to us hereafter. The first chapter is a concise description of the anatomy of the rectum. Among the anatomical data, perhaps not so familiar to all, are the existence of 5 to 8 membranous valves (*columnæ recti Morgagni*) at the upper end of the anal portion of the rectum, in which irregular bodies are occasionally caught and excite inflammation, the fact that the levator ani muscle is nothing more than a diaphragm of the pelvis, whose muscular action counteracts the pressure of the viscera on the pelvic floor; the varying location of the peritoneal folds in Douglas's pouch and the *plica vesico-uterina*, which accounts for the discrepancies in the statements of various authors (thus Malgaigne notes the average distance from anus to peritoneal folds to be in the male 6 to 8 ctmts., in the female 4 to 6 ctmts.; and Richet 10.8 and 16.2 ctmts., respectively, differences, not due to erroneous observation, but to the varying anatomical conditions; the direction of the current of the lymphatics around the anus towards the inguinal glands.)

Before an examination of the rectum is attempted, the same should be well washed out with warm water and the bladder completely emptied.

The examining finger should be well lubricated with some antiseptic ointment (borated or salicylated vaseline) and especial care should be

taken that there be no sores or abrasions on the finger, as syphilitic infection of the surgeon has occurred in this manner on several occasions, facilitated to some extent, no doubt, by the pressure of the sphincter muscles. It is, furthermore, advisable to make the examination under an anæsthetic, absolutely, when an introspection with Sims' or Simon's speculum is deemed important. When the entire hand is introduced into the rectum, this should be done with great caution and should be preceded, if necessary, by two incisions of about one-fourth of an inch on the anterior margin of the anus.

Ten schemata introduced into the text of the third chapter more ably demonstrate the congenital deformities of the rectum than much writing could do. E. divides them into 4 categories: atresia ani, atresia ani et recti, atresia recti, and cloaca congenita, when the rectum empties into the bladder, urethra, vagina at varying distances from their respective orifices (communication of the rectum with the uterus is a very rare pathological condition). The symptoms of absolute retention of the fæces are first inflation of the bowels with consecutive impediment to respiration. Soon the signs of carbonic acid poisoning supervene. Vomiting is set up, at the beginning only of the ingesta, but later on of meconium, and death ensues from collapse. The surgical treatment of these cases must be taken in hand before collapse threatens, but not immediately after birth, as at that time the lower part of the intestine is not sufficiently dilated by meconium. In cases of atresia ani or ani et recti, the incision into the gut must be smaller than that into the skin, and in atresia recti the lower portion of the occluded rectum must be entirely dissected out, care being taken not to injure the sphincters, and then the upper portion disengaged from the surrounding tissues, is drawn down towards the anus and there fastened by sutures. When the bowel cannot be reached from the perineum an attempt must either be made to accomplish this by laparotomy, or colotomy must be resorted to, and here E. strongly recommends the inguinal variety. In all other forms of atresia, whether the rectum communicates with the urethra, bladder or even uterus, an attempt should always be made to disengage the end of the gut from its attachments and bring it down to its normal position, as

experience has shown that even colotomy will not prolong life very much, if these communications are not interrupted.

Lesions of the rectum are often inflicted by syringes and rectal bougies, and several cases of impulsion of fluids into the perirectal spaces and even the peritoneal cavity, are on record from mismanagement of this kind. Lesions of the rectum are generally due to a fall on some pointed object. Perforating gun-shot wounds are most always complicated by comminuted fractures of the pelvic bones and end fatally from pyæmia. In habitual constipation ruptures have been observed in the anal portion and even higher up through the entire rectal wall, complicated by prolapse of the intestines through the rent, the reposition of which most frequently proving impossible. The great dangers of rectal injuries are fæcal extravasation, hæmorrhage and venous thrombosis with consecutive phlebitis. Fæcal extravasation should at the onset be prevented by freely incising the sphincter. Hemorrhage is frequently diagnosed only when collapse comes on, and then a thorough examination of the rectum of the anæsthetized patient should be immediately instituted, the bleeding points sought and ligatured. E. does not rely on rectal compressors.

Under the head of foreign bodies in the rectum a very interesting statistical résumé is given of celebrated cases of this category. E. believes fæcal impactions, forming around gall-stones, masses of hair, coins, and occasionally covered by layers of chalk and magnesia, to be most frequent in women. He tells us of many cases in his own experience, that had been treated for hypochondria, neurasthenia, phthisis, asthma, etc., which he has definitely cured by the prolonged use of purgatives, continued for many weeks. It is important to remember that foreign bodies in the rectum, occasionally, excite violent antiperistaltic movements, which drive them upward as far as the cæcum.

Those of large size can be broken up by introducing one finger along their anterior surface and compressing them against the sacrum, or even by the use of the forceps, but glass or earthenware objects ought never to be treated in this way, as many fatal cases of laceration of the rectum after such proceeding are recorded. With an an-

æsthetic and some patience even the largest bodies can be removed from the rectum in their entirety.

Next, inflammatory affections of the integuments around the anus, of the cavum ischio-rectale and the rectum itself are discussed. In pruritus ani E. with Allingham deprecates the use of opiates and recommends bromides and chloral. In all inflammatory affections a supine position affords much relief, as it tends to lessen the venous stasis in all inflamed parts. In chronic cases we often find a callous degeneration as the result of the infiltration and hypertrophic changes going on in the rectal walls, leading to stenosis, as in the urethra, and such cases, with periproctitis of many years standing, have not infrequently been erroneously diagnosed as incurable cancer. If any abscesses ought to be incised at an early stage, this must certainly be said of those of the ischio rectal cavity, because the superficial perineal fascia affords a strong barrier against their spontaneous perforation towards the external integuments.

Ulcerations of the rectum are the result of various inflammatory conditions, and are classed as traumatic, perforating, follicular, tuberculous, dysenteric and venereal (chancroids and syphilitic) ulcers. Under the head of perforating ulcers are gathered those for which there is no apparent etiology, either clinically or pathologically. Tuberculous ulcers develop from miliary tuberculous eruptions, which coalesce and undergo fatty and caseous degeneration. They form ulcerations of various depth with ragged, undermined edges, spreading in a circular direction and often encompassing the entire rectum. When they perforate the walls of the rectum they give rise to chronic abscesses and fistulæ. Recollecting, however, that internal fistulæ seldom communicate with the rectum otherwise than by a small opening in the mucous membrane, which it is occasionally even impossible to detect, Schuchardt's statement that they rarely develop from typical tuberculous ulcers in the rectum of phthisical patients seems very favorable to us. When the anus is the seat of such ulcers, defecation is generally very painful. Chancroid ulcers in women must generally be explained by an infection from ulcers of the same variety in the vulva, whereas in men they are the result of passive pederasty. They form irregularly defined

and flat ulcers with clean cut edges and are partially covered by a grayish-brown eschar. They have a great tendency to spread (phagedenic variety) and cause extended destruction of the rectal tissues, ending in death of the patient, if not resolutely treated, always leaving almost intractable strictures and fistulæ.

The primary, indurated, the condylomatous and the gummy are the varieties of syphilitic ulcer. E. claims that the gummy ulcer occurs more frequently than is generally admitted. In such cases the morbid process starts in the lower part of the rectum, immediately above the sphincters, and spreads upwards, so that the most recent pathological products are always met with in the upper parts of the rectum. At the outset we notice small, dark nodules, the size of a pea, projecting in the mucous membrane, and containing a brownish, gelatinous fluid. An ulceration, in due time, forms at the apex of these nodules, which spreading and meeting others, gradually destroys a great part of the mucous membrane. The intact patches then often hypertrophy into polypus growths, the syphilitic polypus, a granuloma (Virchow), not to be confounded histologically with other polypi. A correct diagnosis of the nature of the ulceration ought always to be made, if possible, with the assistance of the entire surgical apparatus at our disposal, but it must be borne in mind, in this connection, that in the advanced stages the several diseases present very similar pathological conditions, and that the most expert pathologist will sometimes be at a loss to determine which etiological factor has been at work. In the treatment of gummy ulcers of large dimensions, the iodide of potassium is generally unavailable, as it brings on gastric and intestinal catarrh, inunctions of mercury and injections of weak solutions of bichloride into the rectum are advocated as the best plan of treatment.

Strictures of the rectum are the results of inflammatory or ulcerative processes. The pathological condition is either an inflammatory infiltration and thickening of the intestinal walls or the unavoidable secondary contraction of cicatricial tissue in the walls, or the adjoining perirectal cavities. The etiology is, for the greater part, dysentery or syphilis. Congenital strictures are cases of incomplete atresia ani or recti, and Kohlrausch tells us that they are formed by folds of

mucous membrane containing no muscular fibres. Very rarely, indeed, the circular fibres of the muscular coat of the rectum enter into the formation of strictures, which are then called spasmodic, can only be reached by the examining finger in a standing posture of the patient, and are readily amenable to treatment with bougies. Strictures from cicatricial contraction are generally circular, very tight, and of most varying length. In strictures due to inflammatory infiltration of the submucous tissue, we generally find the mucous and muscular coats intact, or the former is in a state of chronic catarrh. At the ends of the stricture in such cases there is frequently developed a circular tumefaction of greyish appearance, due to hypertrophy of the tubular glands, which emits a whitish fluid on pressure. This must not be mistaken for medullary cancer, although it is questionable if cancer might not develop therefrom.

Among the symptoms of stricture constipation is one of the first, now and then relieved by the evacuation of liquid masses of pus and mucus, which have gathered above the stricture where the morbid processes are still going on, and which is often considered diarrhœa.

The elongated shape of the fæces is the only characteristic of stricture of the anus.

Symptoms of pyrexia profuse, bloody and purulent discharges, violent bearing-down pains in the loins and the back, irritation of the bladder and testicles are rare. In high stricture examination with the bougie becomes indispensable, but care must be exercised in the conclusions arrived at. The diagnosis can only be upheld, when the instrument always enters the stricture at the same distance from the anus, and on attempting to withdraw it some resistance must be felt, as a sign that the stricture has been at all penetrated, Treves in a recent publication in the *Lancet* speaks of the long tube not only as a delusion, but even as a snare, and regards it as valueless as a diagnostic agent.

Tumors of the abdominal viscera, which compress the intestine and simulate stricture must be excluded by careful examination. The treatment of stricture can only be a mechanical one by gradual dilatation, or in severe cases by incision. It seems immaterial whether

wooden, glass or metal bougies are used, but forcible dilatation is always to be avoided, as very often causing severe irritation and even perforation and always much unnecessary affliction. As soon as the extremity of the dilating instrument has been introduced into the strictured part, everything to be desired for the moment has been accomplished, as when, after much labour, we have succeeded in sounding a narrow stricture of the urethra. Gradual dilatation, a larger number being introduced at each sitting, which may be repeated every two or three days, will generally achieve greater success than more violent measures. If incisions are necessary, as a preparatory act to dilatation, E. prefers multiple superficial incisions to those, which, while dividing the stricture, often cut through the entire wall of the rectum with disastrous consequences.

In strictures of the anus plastic operations are preferable to dilatation, which seldom guarantees a permanent cure.

Fistulous canals in ano are surrounded by dense cicatricial tissue, and at the beginning they are lined with granulations, which in course of time, are changed into a smooth surface, not unlike a mucous membrane. The ducts, as a rule, perforate the sphincter muscles rarely opening into the rectum above them, and very seldom into the anus below them. The internal opening is scarcely ever more than two inches above the anal orifice. The treatment of fistula in ano is very liberally considered. We are informed that even in the seventeenth century it was customary to excise, not only the entire fistulous canal, but also the surrounding indurated tissue and part of the rectum, and that these formidable operations generally sealed the fate of the patient by pyæmia or hemorrhage. For Louis XIV the "bistouri royal" was constructed by one of his eminent surgeons and tried on a goodly number of his subjects before his majesty submitted himself to its use with a favorable issue, but not before Cob in 1765 demonstrated the effectiveness of a simple incision were the disease and its curative attempts divested of their horrors. Esmarch uses for his cutting operations a grooved tin sound, which is very pliable and the ends of which form two different sized probes. To discover the internal opening E. recommends the injection of milk into the canal from the external orifice combined with the use of Fergu-

son's speculum, when the liquid will be seen to spurt out in a stream. If the internal opening lies high up in the rectum a second grooved probe is introduced into the anus to meet the one passing through the fistulous canal before cutting. In cases where even a small loss of blood is to be avoided the galvano caustic loop or elastic ligature are practicable. If during the operation the sphincter muscles are divided in several places permanent incontinence of the fæces will sometimes follow, and a partial incompetence of these muscles has even followed a single incision.

From this point of view excision of the fistulous tracks and suture of the wound surfaces have been recommended by Jenks and Lange in this country, and there is no reason apparent why the continuous catgut suture should not give as favorable results in these cases, if all diseased tissues are removed, as in plastic operations on the perineum. Although Jenks published his method in 1884, we do not find the same mentioned in the work under consideration. In persons afflicted with pulmonary tuberculosis it is certainly proper to abstain from operative interference unless the fistulæ cause great annoyance.

About fissures we learn that they are more frequent in women than in men, are generally situated posteriorly, and when, multiple always of syphilitic origin. The beneficial effect of cauterization in these cases is ascribed to the formation of an aschar, which protects the highly sensitive wound-surface from further mechanical insults by the fæces passing, thus allaying pain, and further preventing reflex contractions of the sphincter, levator ani and perineal muscles. Incisions, where cauterization proves ineffectual, until the fibres of the sphincter muscles are distinctly recognizable, seems preferable to forcible dilatation, which ought to be resorted to, as an *ultimum refugium* only.

Prolapse of the rectum ordinarily begins with a prolapse of the anus, gradually pulling down the upper parts of the rectum. Predisposing factors are a laxity of the perirectal cellular and muscular tissues, and in children the flat shape of the os sacrum. Violent straining, coughing, and impeded micturition in children, the subjects of phymosis or stone of the bladder, are direct causes. Douglas's pouch is always drawn down with the prolapse and occasionally the intestines,

filling the pouch, become incarcerated, a condition not to be mistaken for simple incarceration of the prolapsed rectum. If vomiting, persistent constipation with rectal tenesmus, and a bulging out of the anterior half of the prolapse are present, our suspicions ought to be aroused. In the treatment of prolapse, if mechanical measures fail, E. recommends cauterization of the mucous membrane with concentrated nitric acid, reposition of the prolapse and introduction of a rubber tube into the rectum to be retained by adhesive plaster until the fourth day, when it is expelled during defecation. In severe cases the following operation is proposed by E., even if during the same the peritoneal cavity is opened: A wooden bougie with a circular groove is introduced into the prolapse until the groove has almost reached the anus, Over this constriction is then made with an elastic band, after the prolapsed rectum has been made bloodless by Esmarch's bandage. The rectum is amputated at a distance of about one inch from the elastic band, all the vessels are ligatured, and the peritoneum carefully closed with catgut. Upon removal of the elastic band all further bleeding points are secured, and the remaining coats of the rectum are also sutured; the bougie is removed and supplanted by a rectal tube. Incarcerated rectal herniæ are for the greater part reducible without operative interference. The chapter closes with a description of the methods for narrowing the anal orifice and the treatment of invagination of the rectum by the introduction of the entire hand into the anus, or if this should fail, by laparotomy.

Hemorrhoids and tumors are treated in the last two chapters. When several members of the same family have suffered from hemorrhoids, E. thinks that some influencing peculiarities in the mode of living have been transmitted from parent to offspring, rather than a direct hereditary disposition. On the treatment of hemorrhoids after a thorough exposition of the methods of ligation, cauterization and ablation of these tumors, we confess to some astonishment at the following paragraph: "In America Parley some years ago recommended the injection of a few drops of concentrated carbolic acid into these tumors, a method also very frequently used by quacks and recommended as quick, painless and effective. Closer investigation has proved this procedure to

be very painful, unreliable and dangerous, and it is therefore absolutely to be condemned." E. himself has abandoned the use of the cautery and now extirpates hemorrhoidal tumors with the scissors, carefully ligating all bleeding points and uniting the wound-surface with several catgut stitches. The last chapter on tumors of the rectum is full of excellent wood-cuts, macro- and microscopical, which tend so much to facilitate the understanding of the text. We note that cancer of the epithelial variety is by far the most common, scirrhus and encephaloid cancer being very rare. Two interesting cases of melanotic sarcoma from E's own practice are related, with ultimate permanent recovery after operation.

To avoid errors in the diagnosis of rectal tumors, which have no doubt frequently been confounded with chronic inflammatory processes with induration of the surrounding tissues, E. recommends excision, or, if practicable, the removal with the point of the finger of a part of the tissue for microscopical observation. And here again E. urges the importance of a digital exploration of the rectum, and relates the case of several of his own patients that had previously been sent to Carlsbad, Kissingen and other springs, for hemorrhoids, only because the inconvenience of an examination with the finger had prevented a correct diagnosis. The latter must, however, be conducted with the utmost caution as cases of fatal peritonitis have been known to follow the same, and we remember a mishap of this nature in a patient, who died on the second day after digital exploration by several competent surgeons. It is certainly, therefore, not a useless precaution to defer a minute investigation, as to the size and limits of the tumour, until the patient is anæsthetized for operation, which can then immediately follow. Inguinal colotomy is reserved only for such cases, which either on account of extreme debility do not warrant prolonged operative measures, or in which the tumor has perforated the walls of the intestine and formed extensive adhesions with the surrounding tissues.

Some of the wood-cuts and colored plates in the first have been omitted in this second edition, and the latter are no more interspersed throughout the text, but affixed to the end of the volume. They represent, with few exceptions, cases from E's own practice, and great

praise is due both to the author for their judicious selection, as well as the artists for their excellent execution of the same.

FRED KAMMERER.

THE DISINFECTION OF THE PHYSICIAN'S HANDS, WITH OBSERVATIONS ON THE BACTERIOLOGICAL CHARACTER OF THE ACCUMULATIONS, UNDER THE FINGER-NAILS.¹

Of the many brochures which have in late years appeared, and which treat of the theme of the disinfection of the hands of the physician, two are worthy of especial notice. These papers were written by Kümmel 1885-6. This author attempted to find a means by which the hands could be freed from micro organisms, irrespective of the question of their innocuousness or their dangerous characters. The separation of micro-organisms into pathogenic and non-pathogenic so far as the above question of disinfection is concerned, is still only of theoretical value. The practical side is still to free the fingers of all varieties of germs. Kümmel found that the disinfection of the hands is by far a more difficult task than the disinfection of instruments and other septic utensils. The fissures and rhagades in the hands make the task a very laborious one. Kümmel's process of washing each hand carefully with very warm water and potash soap and brush, and the combination therewith of a 5% solution of carbolic acid, makes this a very irritating method to some delicate hands. After the above disinfecting method the fingers were carried into nutritive gelatin, and if no colonies of micro-organisms appeared after a few days the hands were considered aseptic. Forster, of Amsterdam, and his pupil Wassing, have proceeded in a similiar manner. Forster found that the disinfection of the hands *a la* Koch was no easy matter. The methods in vogue in practice to free the hands of germs did not, according to Forster, accomplish this object. Forster found that a one or one-half pro mille solution of sublimate gave the best results in disinfecting the hands, while Kümmel found these useless, and the most satisfying so-

¹Untersuchungen und Vorschriften über die Desinfection der Hände des Arztes nebst Bemerkungen über den bakteriologischen Charakter des Nagelschurutzes von Prof. P. Furbringer, Director am Berliner Krankenhaus Friedrichshain.

lution to him appeared the one in five of carbolic acid, an apparent contradiction in the work of these authors. Professor P. Ffirbringer in the above paper has gone a step further. He proves that fingers supposed aseptic and carried or bored into gelatin will not give reliable data as to their degree of freedom from germs. The subungual space does not come into contact with the elastic gelatin, and fingers which might infect the peritoneum when bathed in the warm fluid of this cavity, will leave the gelatin apparently aseptic. Ffirbringer could find a correspondence between the subungual space (bacteriologically) and the previous occupation of the hands of the physician. The ungual side of this space was more fertile ground for these organisms than the dermal side. When this filth is examined with aniline dye directly with the microscope, the number of micro-organisms is far less than the particles of dust, mineral, and vegetable. It is rare to find the micro-organisms in the majority (as regards numbers) and much rarer is it to find pictures suggesting fecal matter. If the filth of the subungual space be cultivated in media, we find that the varieties of micro-organisms may be very great, or there may be a marked preponderance of one peculiar variety of microbe. Between these two extremes we find all gradations. In the growth of the bacteria it is probable that certain forms of micro-organisms eventually exterminate others less tenacious of growth; hence the preponderance of this form.

The above index of the bacteriological results to the latest occupation of the physician is a marked result of Furbinger's investigations, yet there were fingers which for days had not come into contact with pus, and yet after disinfection the particles from the subungual space showed the presence of the staphylococcus.

Again, *exceptionally*, where the hands had but recently been in contact with pus and no previous marked disinfection of the hands had been performed, the coccus was absent. In all experiments the filth of the subungual space, though very minute in quantity, gave a large number of microbe colonies in cultivation.

Again, it is to be remarked that where the hands had been in manipulation with putrid post-mortem material or abscesses, the filth of the

subungual space did not when cultivated, produce such a striking contrast to the result obtained from the normal filth of the fingers as one would expect. The author's method was to extract from the subungual space of the *disinfected* hands of the physician particles of matter almost macroscopically invisible and carry these particles to sterilized gelatin tubes. The gelatin in these tubes being fluidified, then agitated, and placed on an incline. The plates were only used to study in exceptional cases, characters of the colonies. A sterilized platinum point, or a clean pointed match end was used to extract the particles. Assistants and chiefs of clinics were subjects of experiment. Thirteen men were examined in this way after they had most painfully and diligently disinfected their hands, fingers, etc., according to prescribed methods in vogue. The time employed to brush, disinfect and trim the hands varied from two to ten minutes. The solutions used were carbolic or sublimate combined with soap. In *only one case were no cultures of colonies* of micro-organisms obtained. The author found that if any solution aided the disinfection of the hands better than another it was sublimate (Forster).

Again, different agencies from the brush or fluid used influenced the thoroughness of the disinfecting process, the insensible oiliness of the skin protected micro-organisms from the deleterious action of solutions when in pure cultures they were rendered innocuous, even with solutions of milder strength. The author endeavored to find a method of removing the oily layer in the epidermis, to shorten the time of disinfection and at the same time not injure the hands.

Without going into great detail we may summarize the following: After using the most irritating alkalies 10% and 5% solutions, brushing the hands and nails for a variable length of time, and then treating with strong carbolic and sublimate solutions the author found that he obtained colonies in the gelatin. The following method was found to give brilliant results and the most perfect disinfection of the hands and subungual space. The nails having first been carefully trimmed and cleaned from visible filth, the hands are cleaned for a minute or a minute and a half with brush and soap, especially the subungual space.

The hands are then washed in not less than 80% alcohol for a minute, and then before evaporation of the same they are brought into a 2-1,000 solution of sublimate or 3% carbolic acid solution, and washed for an additional minute. The advantages of the above, are first, the, *certainty* of disinfection, the saving of time, the sparing of the hands and finally the cheapness. By the above method either none or only one or two colonies (germs) were found in a culture. It is useful to know that in order to prevent decomposition of the bichloride in water, the author finds the following a stable solution and equivalent after months to a solution of sublimate in distilled water, strength one pro mille. To two litres of clean well-water add 10 c.cm. of an alcoholic solution of sublimate (1 in 5) and one gramme of acid aceticum Ph. G.

HENRY KOPLIK.

INDEX OF SURGICAL PROGRESS.

CHEST AND ABDOMEN.

I. The Processus Vaginalis Peritonei. By HUGO SACHS.

The open or partially obliterated processus vaginalis is a typical hernial sac with all the characteristics of an inguinal hernial sac. The opening to the sac is closed by a valvular arrangement; particularly is this so in the case of the diverticulum Nuckii. In the latter case it can be caused to enlarge by traction on the mesentery of the ileum or sigmoid flexure.

The diameter of this valvular opening is in boys, as a rule, larger on the right side than on the left. In girls no such difference between the two sides is found. The diameter of the opening is, moreover, larger in boys and older children than in girls and young children. The form of the open or partially obliterated processus vag. corresponds to the different forms of the sac in external inguinal herniæ. The relation of the *processus* to the structures in the spermatic cord is variable both in its situation and connections.

The smooth muscular tissue of the cord, however, is regularly situated on the posterior and lateral walls of the processus. The processus is obliterated by a process of granulation, beginning in the middle third of the portio funicularis, proceeding from this point more rapidly downwards than in an upward direction. After obliteration the processus disappears, leaving no trace of its existence. This obliteration begins in the first 10 to 20 days after birth, proceeding slowly. In the majority of cases the diverticulum of Nuck has disappeared at the time of birth. If found later it is not uncommon to find it as frequent in the later periods of life as immediately after birth. The processus vaginalis and also the diverticulum Nuckii are more frequently found patent on the right side. This relative patency of the processus vaginalis in boys and girls and the course of its obliteration

in both sexes does not stand in opposition to the respective frequency of herniæ, and for this reason in children the processus vaginalis would very probably seem an important predisposing element to the formation of external inguinal herniæ. At all events it is not necessary to assume a predisposing weakness of the inguinal canal as to breadth and length. There are no rough anatomical data by which we can distinguish the acquired from the congenital inguinal herniæ. The microscopical examination of the relations of the cremaster muscle to the hernial sac above can give us positive conclusion as to whether the above herniæ form also in cases of obliterated processus vaginalis.—*Langenbeck's Archiv.*, Vol. XXXV, Part ii.

II. On the Inversion of the Patent Diverticulum of Meckel and its Complication with Prolapse of the Intestine. By ARTHUR BARTH (Berlin). The rare occurrence of cases of this congenital malformation, especially its complication with prolapse of the intestine is noted by the author. He records also a case of this nature, on which operative measures for relief of the deformity were performed. The patient died from the immediate effects of operation. Two classes of cases are found in the literature; first, those of simple inversion of a patulous diverticulum, and again the cases where this was complicated with prolapse of the intestine. Wernher, Marshall, Hickman, Roth, Chandelux record cases of the first variety. Siebold, Gesenius, Dufour King, Weinlechner, Helweg have met with instances of the second class. The deformity must be connected with a development of the ductus omphalo-mesaraicus into the umbilical cord. By ligation of the cord and subsequent necrosis a fistula remains. If the umbilical ring is large, then the abdominal pressure will favor an inversion (author's case). A subsequent hernia of the intestine must also be feared. If the diverticulum is of small calibre and the umbilical ring narrow, such a complication does not occur. As to the diagnosis, the author lays stress upon the presence of fæcal matter found on sounding the fistula. We should differentiate from a possible patent urachus and an abscess (perforating). Finally, the possibility of an umbilical hernia in which coils of intestine have been

ligated with the cord and an artificial anus has resulted must be thought of. An open inverted diverticulum consists in a short cylindrical red tumor on the site of the umbilicus of the infant. It is covered with mucous membrane. On the summit of the tumor an opening is seen leading to a fistula. A sound introduced in the fistula finds its way into the abdominal cavity, and faecal particles are generally discovered. If prolapse of the intestine exist, we have added to the above a two-horned, transversely-situated tumor with a pedicle corresponding to the invaginated diverticulum. At each end of the tumor we have an opening from one of which, if no strangulation exist, faecal discharges occur. The prognosis in simple inverted diverticulum is good. In the cases complicated with prolapse of the intestine it is very bad. All of the latter cases have ended fatally. In the simple cases some surgeons have had good results with patient application of lapis; others have freshened the borders of the wound and inserted sutures (King) with good result. In all cases a compress should be applied to guard against prolapse of the intestine. If this be present, author advises narcosis, laparotomy by incision 2 cm. above and below umbilicus, reposition of intestine, separation of diverticulum from abdominal wall and intestine, extirpating at the same time the umbilical ring, sewing up intestinal wound by Czerny's suture, replacement of the intestine and abdominal suture. Early operation is advocated and delay in attempted taxis and reposition should be avoided. If the gut has become strangulated an artificial anus must be formed.—*Deutsche Zeitsch. f. Chir.*, Bd. XXVI, Heft 3 and 4.

III. Bardeleben's Operations for Herniotomy. By A. KOHLER. This is a statistical compilation of 34 herniæ coming for treatment in Bardeleben's clinic. As to the frequency of the herniæ it was found that of twenty-two inguinal hernia 18 occurred in men.

Of these cases twelve (males) were external inguinal hernia of right side; 5 were males with ext. inguinal hernia of left side; the remainder were equally divided among the women.

One internal inguinal hernia (dextra) occurred in a male.

Of 12 crural herniæ 8 occurred in females.

These small figures, in the main, corroborate those of Bardeleben (*Lehrbuch Chirurg.*).

Inguinal hernia are more common on the right side. Femoral herniæ also were more common on right side (7 in 12 cases). These differences are most marked in men for inguinal and women for femoral herniæ. The oldest case among the men was aged 81 years, (H. fem. incarcerated, herniotomy, cure) the youngest 19 years of age with reducible inguinal hernia. The data as to causation were uncertain. In most cases the patients knew that the hernia had existed a long time, and after some severe exertion, cough, jump or trauma, became irreducible. In many cases of inguinal hernia a predisposition to hernia (large ring, impulse of the intestines to the examining finger) was found on the opposite side. In two cases scrotal herniæ were observed adherent to the sac and therefore only partially reducible.

The symptoms could be relieved by truss only in men and this in 2 femoral and 11 inguinal herniæ. (8 cases were below 4 years of age).

Taxis (in deep chloroform narcosis) was successful from 12 hours to 8 days after the appearance of symptoms of strangulation. This was the case in four old inguinal (male) and one (female) femoral hernia of three years' standing.

Herniotomy was resorted to in 16 cases only after careful taxis in narcosis had failed. The operation was performed a few hours to five days after symptoms of strangulation had set in. Exertion—a jump, a fall, cough, vomiting, are among the mentioned exciting causes of strangulation.

Of the above cases 9 were femoral herniæ and 7 were inguinal.

The contents of the hernial sac consisted in 4 cases of omentum alone. In 8 cases intestines alone were present, in 3 cases intestine and omentum, and in 1 case the sac was found empty, occupied by cysts (femoral H). The sac was always opened, being first fixed at the ring and it was ligated with thick catgut or closed with purse string sutures. In 16 cases the 2 deaths were in women in whom prolonged efforts of taxis had caused peritonitis.—*Deutsch. Zeitschr. f. Chir.*, Bd. XXVI, Hft. 12.

HENRY KOPLIK (New York).

INGUINO-PROPERITONEAL HERNIA.¹

BY WILLIAM STONE TORREY, M.D.,

OF BROOKLYN.

UPON August 19, 1887, at five o'clock P. M., I was called to see Thomas H., male, æt. 30 years, a horse shoer by occupation. The patient gave the following history:

He had been ruptured for several years, and had reduced the hernia himself whenever it had descended, keeping it supported by an ordinary spring truss, having a horse hair pad covered with leather. Nine days prior to my visit upon arising from bed one morning, the hernia descended. He occupied half an hour in unavailing attempts to effect reduction, renewed attempts proving equally unsuccessful. Since that time there had been no evacuation of the bowels, and vomiting had made its appearance shortly afterwards, which for the past five days had been stercoraceous in character.

For several days past he had been unable to pass his urine without the aid of a catheter. He had been growing progressively worse, and expressed himself as willing to submit to any measures which would afford him relief from his distressing condition.

The general appearance of the patient was bad. He was pale, covered with cold perspiration, and presented an anxious countenance. The *temperature* was elevated to 101.4°, *pulse* 146, very irregular in rhythm and volume, but compressible and not the wiry incompressible pulse so characteristic of peritonitis. The characteristics of the pulse were essentially those, which are found present in nearly all conditions accompanied by profound adynamia.

The only pain complained of was paroxysmal and cramp-like in its character, being referred to the right side of the of the abdomen. The tongue was dry and brown, the teeth and gums covered with sordes, and finally the patient exhibited slight subsultus tendinum. *Physical examination* revealed a tumour occupying the *left* side of the scrotum, which was flat upon percussion, and from which the patient stated fluid had been taken several times. On the *right* side there was a small scrotal hernia which was irreducible by any means that I considered

¹Read before the Brooklyn Pathological Society, Dec. 22, 1887.

wise to employ at that time. The testicle was felt to be in the scrotum situated posteriorly, and although the hernial loop had passed below it, the testis was completely descended, and was not pressed up against the external abdominal ring. The abdominal wall on the *right* side presented a swelling as large as the hand, just above Poupart's ligament and midway between the crest of the ilium and the linea alba, which was tense but elastic on palpation and resonant upon percussion. Tympany existed only in a moderate degree, and there was no general abdominal tenderness.

The bladder was somewhat distended, and upon the introduction of a catheter a quantity of urine was obtained. By the introduction of the catheter a stricture was detected a short distance behind the meatus, and another at a greater depth, but anterior to the bulbo-membranous junction. Vomiting occurred during my examination, the matters vomited emitting the characteristic faecal odor. The patient was unable to give definite information as to the length of time the tumour in the abdominal wall had existed, but was certain he had noticed it for some time prior to the last descent of the hernia, nine days ago. A diagnosis of intestinal obstruction dependent upon some pathological condition affecting the existing hernia was readily reached, but the nature of such condition was felt to be very obscure. The profoundly adynamic condition in which the patient was found and the fact that obstruction had existed for nine days, and stercoraceous vomiting for five days, made the outlook appear anything but promising. The necessity for immediate interference having been explained, I proposed that the patient be anæsthetized, and if, after what should be deemed a judicious employment of taxis, the condition should remain unrelieved, that immediate operative measures should be instituted as offering the only chance of life, and that in consideration of the bad condition of the patient, a very small one. My proposal being accepted, an appointment was made for 8 o'clock that evening.

Operation, in which I was valuably assisted by Dr. J. B. Bogart and Dr. John J. Conway.

The patient having been anæsthetized, a trocar was introduced, the contents of the hydrocele on the left side evacuated and the bladder emptied through the catheter. Gentle taxis was then tried; by it the hernia could be apparently reduced, but upon such reduction the tumour in the abdominal wall was increased in size, and upon removal of pressure the scrotal tumour immediately reappeared. It was now regarded as probable that the abdominal tumour was a loop of intestine within the abdominal wall. Realizing the futility of attempting

reduction by the further employment of taxis, the patient was placed upon the table for operation. While recognizing the possibility of being obliged to resort to laparotomy, I deemed it best to first go through the steps of the operation constituting herniotomy. After careful antiseptic preparation of the parts, the tissues were divided down to the sac by direct linear incision. The sac was found to be adherent at the internal abdominal ring, the adhesions being readily separated, but reduction could not then be accomplished. The sac was now opened, a small quantity of dark fluid blood escaped, and the intestine came into view. The gut was distended with gas, but otherwise in excellent condition, even being free from intense congestion.

The cord and testicle were found contained in the sac with the bowel, thus demonstrating that the hernia belonged to the congenital type of scrotal hernia, due to the non-closure of the vaginal process of peritoneum at the internal abdominal ring after its descent in front of the testicle to form the tunica vaginalis. The testicle was well down in the scrotum, and not retained in the inguinal canal.

While searching for the constriction in the direction of the internal abdominal ring, my forefinger entered a cavity which conveyed the impression of being the abdominal cavity. The position of the forefinger corresponded with the location of the tumour in the abdominal wall, and it was again demonstrated that the scrotal loop could be apparently reduced but with the effect of increasing the size of this swelling.

After consultation with my colleagues I determined to extend the incision in the abdominal wall over the seat of the swelling. This incision, which was commenced at the superior pillar of the external abdominal ring, and carried upwards through the muscular structures, resulted in a laying open of a pouch situated between the transversalis fascia and the overlying muscles which was found to contain a loop of intestine from 12 to 18 inches in length. The parietal peritoneum forming the sac was very much thinned and firmly adherent to the walls of the cavity. There were numerous adhesions between the intestine and the inside of the sac, which were resistant and evidently not of recent formation. No strangulation could be discovered in this situation, the intestine presenting an excellent appearance.

After freeing the adhesions between the bowel and the inside of this sac, I followed the intestine to the internal abdominal ring, where it was again found to be adherent to the sac. The adhesions here were readily severed, as they were soft and undoubtedly of recent formation. Reduction, which was now attempted, was attended by great difficulty on account of the internal abdominal ring being narrowed by

the products of recent inflammatory action, but was finally effected after division of the ring with the hernia knife. Reduction completed, the sac was brought together by a continuous catgut suture, the remaining parts being approximated by means of deep sutures of silver wire and superficial sutures of iron dyed silk. An antiseptic dressing was applied, the patient being then returned to bed.

Ice was given to control vomiting, and ʒij of brandy with a small quantity of milk and lime water ordered q. i. h. also gr $\frac{1}{2}$ ext. opii aqu. in pill form, night and morning, with the object of keeping the bowels quiet for a few days. Stringent instructions were given to allow the patient on no account to change from the recumbent position.

At my visit on the following day, Aug. 20, there was no marked tympany and no general abdominal tenderness. The temperature was 101.4°. The condition of the heart, as indicated by the pulse, presented the most serious feature in the case, the pulse being very rapid, and possessing the same characteristics noticed before the operation. There had been no vomiting. The brandy and milk was continued, and a small quantity of digitalis ordered in addition.

On Sunday, Aug. 21, the dressing having become loosened, it was removed, a fresh one being applied with the assistance of Dr. Bogart. The appearance of the wound was all that could be desired. There were no indications of pocketing of pus and no tympany, or abdominal tenderness beyond a little soreness along the line of incision. The general condition of the patient at this visit was very encouraging. The tongue had become moist, the sordes were beginning to loosen from the teeth and gums. Temperature 100.8°. Pulse 116, stronger and more regular. The brandy and milk was continued, and my caution to the attendants regarding keeping the patient in the recumbent position renewed.

At my visit the next morning, Aug. 22, I was informed that the patient had arisen from bed, seated himself upon the vessel and obtained a large and free evacuation from the bowels. The attendants had permitted this despite my caution, although there was a bed pan in the house. Before getting back to bed he had a "sinking turn" as they expressed it. I found the pulse almost imperceptible and so rapid that it was impossible to count it. After administering stimulants hypodermically, I left the house, promising to return again that evening. I, was hastily summoned during the afternoon, and found upon my arrival that the patient had been up again, and had been attacked by syncope before he could return to bed. From this attack he only partially recovered, dying of heart failure about 5 o'clock that afternoon, hav-

ing lived about 90 hours after the operation. It is to be regretted that an autopsy could not have been obtained. I have presented the history of this case on account of the very unusual pathological conditions found.

Prof. D. Hayes Agnew¹ alludes to a condition sometimes met with, generally in connection with congenital hernia, in which diverticula are formed from the inguinal sac extending in various directions within the abdominal wall, forming the 'Interstitial' or 'Intraparietal' hernia of some authors.

Prof. Ashurst² speaks of a form of hernia in which, owing to the obstruction of an undescended testicle, prolongations of the sac (vaginal process in the case of congenital hernia) extend in various directions within the abdominal walls forming the 'Interparietal', or 'Intermuscular' hernia of some writers. In 1876, Dr. R. U. Krönlein³, who was formerly Langenbeck's assistant, published a paper in which he called attention to this condition, and proposed the term inguino-properitoneal hernia, as descriptive of that condition where a loop of intestine had been or should be found contained in a diverticulum of the inguinal peritoneal sac and situated in an unusual position within the abdominal parietes, anterior to the parietal peritoneum proper.

In 1880 Krönlein⁴ published a second paper upon the same subject in which he presents 14 cases collected and reported by Streubel⁵ in 1864 in which apparent reduction of an inguinal hernia was accomplished, but symptoms of strangulation persisted and death occurred, the autopsies revealing a loop of intestine contained in a diverticulum of peritoneum wholly or partly within the structures forming the abdominal parietes. To the 14 cases reported by Streubel, Krönlein adds 9 cases collected by himself where the diagnosis of the condition was also made at the autopsies. In the same paper he, in addition, reports a case of reducible inguino-properitoneal hernia where the condition was recognized, the patient recovering.

In the issue of the *Medical News* for January 22, 1887, is contained an article by Dr. Chas. W. Dulles, of Philadelphia, entitled "Hernia Inguino-properitonealis" in which he describes a case operated upon by himself. The case was one of con-

genital inguinal hernia accompanied by an undescended testicle, and presented a tumor in the abdominal wall above Poupart's ligament. Herniotomy was performed during which a properitoneal sac was found somewhere within the structures forming the abdominal wall containing a loop of intestine which was strangulated. The exact anatomical relations are not defined. Reduction was effected; symptoms of strangulation persisted, the patient dying about 90 hours after the operation.

The autopsy revealed the fact that the strangulation had not been relieved, a knuckle of intestine firmly bound together being found in the right iliac fossa, and near it the atrophied right testicle which had been carried into the abdominal cavity along with the bowel. Dr. Dulles gives a very thorough review of the literature bearing upon the subject, and makes frequent allusion to Krönlein's work. To the 24 cases reported by Krönlein, Dr. Dulles adds 9 (his own included) collected by himself, in 5 of which the diagnosis was made prior to or during the performance of the operation, all of which recovered, the condition in the 4 fatal cases being discovered at the autopsies. This makes a total of 33 cases with 27 deaths.

The *New York Medical Journal* for April 23, 1887, contains an article by Dr. Frank Hartley, of New York, which is entitled "Inguino-properitoneal Hernia." Dr. Hartley presents the history of a case admitted to Roosevelt Hospital on August 15, 1886, with symptoms of intestinal obstruction which had existed for a few hours. There was a history of inguinal hernia and of its descent and reduction 5 days prior to admission. On examination no intestine or omentum could be discovered in the scrotum or inguinal canal. The abdominal wall presented a tumor in the left iliac region as large as two fists, which was resistant, painful under pressure and dull upon percussion. Median laparotomy was performed, a loop of intestine being found contained in a properitoneal sac situated between the parietal peritoneum and the transversalis fascia. The patient made a good recovery.

With Dr. Hartley's case and my own the total number of cases that have apparently been placed upon record since 1749 is 35, with 28 deaths. Dr. J. B. Bogart of this city has at

present a case under observation which is in all probability a reducible properitoneal hernia. The subject is a child, having a congenital hernia accompanied by an undescended testicle. As a result of the obstruction formed by the undescended testicle the protrusion has dissected upwards and outwards, between the planes of the antero-lateral abdominal parietes towards the crest of the ilium. The future developments in the case will be watched with interest.

The mechanism involved in the production of properitoneal hernia forms an interesting study.

Bar⁶ and Richter⁷ explain it as a congenital anomaly of the parietal peritoneum.

Streubel offers the following explanation: The neck of the sac becoming contracted, pressure upon the contents drives the firm cicatrix of the neck, up and presses out a lateral diverticulum between the structures of the abdominal parietes above the peritoneum. He states that this result may be favored by the action of an imperfect truss, or caused solely by the obstruction of an undescended testicle. To this view Krönlein adheres in most essential particulars.

It can readily be appreciated that the mechanical conditions present in hernia of the congenital type peculiarly favor the production of pro-peritoneal hernia.

It would not be difficult to regard the existence of a properitoneal sac situated between the parietal peritoneum and the transversalis fascia, as a congenital anomaly in the distribution of the parietal peritoneum. Although I have made careful inquiry from those in positions offering ample facilities for the observance of such an anomaly during the dissection of the cadaver, I have been unable to discover that such an anomaly has ever been found, without bearing an intimate relation to an existing hernia.

It would be exceedingly difficult to explain the existence of a properitoneal sac in any position anterior to the internal abdominal ring, otherwise than as an acquired condition.

In the case that I have presented the condition was that of a congenital hernia without the usual accompaniment of an undescended testicle. It would seem that the patient's occupation, that of horse shoer, presented peculiarly favorable cir-

sumstances for the production of a properitoneal sac. The explanation of the pathological condition that has suggested itself to my mind is as follows.

First.—(a). That at some time in the past, while employing more violent means than usual to effect reduction, instead of passing the bowel through the int. abdominal ring a passage was effected by traumatism between the transversalis fascia and the overlying muscles, the truss applied and the bowel retained in this position—or

(b). The neck of the sac having become contracted, as suggested by Streubel, the action of the truss in the pursuance of the patient's occupation resulted in the sending off of a diverticulum from the inguinal sac, thus forming a properitoneal pouch into which the loop of intestine was at some time reduced and retained in this position by the application of the truss.

Second.—That upon the next descent of the hernia, another portion of intestine having descended from the abdominal cavity, reduction was effected into the same position, the loop of the intestine in the properitoneal sac being thus increased in size. Following this, inflammatory action of a low grade occurred, resulting in the adhesion of the bowel to the inside of the sac, and securing its permanent retention within the structures forming the abdominal parietes.

Third.—That nine days prior to the operation, as a result of the employment of violent taxis, inflammatory action was excited in the neighborhood of the internal abdominal ring, the products of such action securing the bowel at this point.

Fourth.—The narrowing of the internal abdominal ring by products of recent inflammatory action effected a diminution in the calibre of the intestine, thus forming obstruction to the passage of the contents of the bowels, and favoring impaction above the seat of hernia.

It would seem that the condition was that of an incarcerated, obstructed, inguino-properitoneal hernia.

This explanation is substantiated by the following facts:

1. The existence of an abdominal tumor for a comparatively long time prior to the occurrence of symptoms indicating intestinal obstruction.

2. The presence of organized adhesions between the loop of

intestine and the inside of the properitoneal sac, demonstrating that they were not of recent formation.

3. The absence of constriction at any point other than at the internal abdominal ring with the evidence of recent inflammatory action in that situation.

4. The favorable mechanical conditions offered for the production of a properitoneal hernia by the action of the truss in the pursuance of the patient's occupation, that of horse-shoeing.

5. The frequent employment of violent taxis.

The above explanation is further substantiated by the statement of the patient to the effect that reduction was often accomplished with great difficulty and accompanied by severe pain. During my first examination he begged to be allowed to attempt reduction once more. From the violent manner in which he employed taxis I could almost credit him with ability to place the intestine in any part of the abdominal wall at will, and am only surprised that inflammatory action of a higher grade was not excited.

The diagnosis of this condition will be very obscure, and must always remain to a greater or less extent a matter for conjecture. It is of vital importance that the true pathological condition be recognized during the performance of an operation, and appropriate measures be exhibited for its relief. This point is emphasized by a case operated upon by Langenbeck in 1875, and reported by Krönlein in 1876. The hernial tumor occupied the right groin. Reduction was effected, but symptoms of strangulation persisting, reduction *en masse* was suspected by Langenbeck with internal strangulation. The next day he cut down upon the tumor, resected a portion of gangrenous intestine, sewed up the wound and replaced the gut, as he supposed, in the abdominal cavity. Death occurred the following day, the autopsy revealing the fact that the operation had only opened a small sac in the inguinal canal, a properitoneal sac containing a loop of intestine being found between the transversalis fascia and parietal peritoneum.

The prognosis in these cases when the pathological anomaly is recognized before or during the performance of the operation, appropriate measures being taken for its relief, and the

physical condition of the patient favorable, should be that of recovery.

In cases similar to that described by Dr. Hartley in which the scrotum and inguinal canal are free from hernial protrusion and the properitoneal sac is situated between the transversalis fascia and the oparietal peritoneum, median laparotomy would afford the most convenient access to the parts, but, on the other hand, when the properitoneal sac is situated in any position anterior to the internal abdominal ring, an additional loop being contained in the scrotum or inguinal canal, as instanced in my own case, the exigencies could only be fairly met by a lateral operation.

¹Agnew's Surgery, Volume I, page 471.

²Ashhurst's Surgery, 3d edition, page 815.

³Herniologische Beobachtungen aus der v. *Langenbeck's Archiv.*, Bd. XIX, pp. 408-425, 1876, I, Hernia inguino-properitonealis incarcerata.

⁴Weitere Mittheilungen über Hernia inguino-properitonealis. *Langenbeck's Archiv.*, Bd. XXV, 1880, pp. 548-579.

⁵Streubel C. W., Ueber die Schein-reductionen bei Hernien, etc. *Verhandlungen der Med. Gesellschaft der Aerzte in Wien.*, 1864, No. 15.

⁶Bär. *Prager Vierteljahrsschrift*, Bd, IV, 1866.

⁷Richter E., Studien zur Lehre von den Unterleibsbrüchen. Leipzig und Heidelberg, 1869.

AN EXPERIMENTAL CONTRIBUTION TO INTES-
TINAL SURGERY WITH SPECIAL REFER-
ENCE TO THE TREATMENT OF
INTESTINAL OBSTRUCTION.¹

(CONTINUED.)

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NOTHNAGEL'S TEST.

IN experimenting upon animals for the purpose of studying the functions of the intestinal canal in health and disease, Nothnagel made the discovery that when the salts of potash are brought in contact with the serous surface of the bowel circular constriction takes place, and when the peritoneal surface is touched with a crystal of common salt ascending peristalsis is produced. The sodic chloride test I applied in 16 cases, and found Nothnagel's observations corroborated in 15 cases, by subsequent anatomical examination. In the remaining case where a wrong conclusion was drawn the error might have been due to a faulty observation, or the observation was not continued for a sufficient length of time. If, in the human subject these observations could be verified, it would be of great practical importance to surgeons in operations on the intestinal canal whenever it becomes necessary to determine which is the ascending or descending part of the bowel.

Experiment 45. Dog, weight 30 pounds. Circular section of ileum and immediate enterorrhaphy by invagination with rubber ring and two catgut sutures. Intussusceptum invaginated not more than a quarter of an inch. A few days after the operation stools mixed with blood, no other unfavorable symptoms. Animal killed fourteen days

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after operation. Wound united firmly. A number of omental and intestinal adhesions. A small abscess in mesentery at point of operation. No obstruction of any kind. On opening the bowel the walls at site of operation were very thick corresponding to the three intestinal coats, which had become considerably attenuated. The inner surface shows the point of junction of the intussusceptum with the intussusciens in the shape of a circular ring of mucous membrane. The most contracted portion is large enough to admit the little finger.

Experiment 46. Dog, weight 15 pounds. Section of ileum and circular enterorrhaphy with rubber ring and two catgut sutures. Depth of invagination one-third of an inch. No unfavorable symptoms after operation. Animal killed after seven days. Wound completely united. Firm union of visceral wound; no gangrene of intussusceptum. Rubber ring retained *in situ* by catgut sutures, which are easily torn. Upper end of rubber ring matted with hair. No obstruction. Lumen of bowel somewhat contracted by a circular ridge of mucous membrane, which indicates the junction of the two invaginated ends of the bowel.

TRANSPLANTATION OF OMENTAL FLAP.

In most all post-mortem examinations of specimens from operations on the intestines, I observed that the omentum was adherent over a greater or less surface at the seat of suturing. I also observed that perforations never occurred wherever this additional protection to the peritoneal cavity had formed. To anticipate nature in protecting the peritoneal cavity in this manner I commenced to transplant an omental flap about an inch in width and sufficiently long to reach around the bowel, over the neck of the intussusciens, where it was fastened on the mesenteric side by two catgut sutures. The flap was taken either from the margin of the omentum or from its middle, care being taken to take some portions supplied with a vessel of considerable size. Its base was left attached to the omentum, all bleeding points were carefully tied with catgut ligatures. The two catgut stitches used for its fixation were passed twice through the flap, its base and free end, and the mesentery in such a way that when tied the direction of the suture corresponded to the course of the mesenteric vessel, so that after tying they would not interfere with the vascular

supply of the bowel. When the flap was taken from middle of the omentum, the lateral halves were united with one or two catgut sutures before closing the abdominal wound.

Experiment 47. Dog, weight 40 pounds. Ileum divided 18 inches above ileo-cæcal region, and the ends united by invagination with rubber ring and two catgut sutures. Transplantation of omental flap one inch in width around the whole circumference of the bowel over neck of intussusciens, fixation with two catgut sutures on mesenteric side. Invagination one-third of an inch in depth. Animal killed two weeks after operation. Abdominal wound perfectly healed. Omental flap firmly adherent to bowel over neck of intussusciens. Bowel at seat of operation much thickened; rubber ring gone; lumen of bowel at its most contracted point large enough for the passage of the little finger.

Experiment 48. Dog, weight 20 pounds. Complete division of ileum and immediate union of divided ends by invagination with rubber ring and two catgut sutures. Transplantation of omental flap two inches in width over the neck of the intussusciens. On third day stools mixed with blood. Died on the 5th day. Wound not united; omental flap firmly adherent except at a small point on mesenteric side where a minute perforation had taken place from circumscribed gangrene of the intussusceptum. Rubber ring only loosely held by one of the sutures. Lumen in invaginated portion quite narrow, but permeable.

Experiment 49. Dog, weight 15 pounds. Complete section of ileum and union of divided ends by invagination. The rubber ring used was only one-third of an inch wide, while formerly none were used less than half an inch in width. Neck of intussusciens protected by an omental flap two inches wide. The dog remained perfectly well, and was killed 25 days after operation. Abdominal wound completely healed, covered on the inner side by adherent omentum. Rubber ring gone. Lumen of bowel at most contracted point readily admits the little finger. No signs of obstruction. Omental flap adherent throughout.

Experiment 50. Dog, weight 22 pounds. Division of ileum and suturing in usual manner by invagination with rubber ring and two catgut sutures; transplantation of omental flap.

The dog remained perfectly well and was killed 23 days after operation. A number of intestinal adhesions produced several flexions. Point of operation four feet above the ileo-cæcal region. Omental

flap firmly adherent to bowel throughout. Rubber ring gone. Lumen of bowel in invaginated portion quite large. The invaginated portion atrophic and retracted so that it appears in the shape of a firm ring and indicated in the interior by a circular prominence of the mucous membrane. No evidence of obstruction.

Experiment 51. Dog, weight 15 pounds. Complete division of the ileum and reunion of ends by invagination. Transplantation of omental flap two inches in width over neck of intussusciens, two cat-gut fixation sutures. Second day after operation stools bloody. After this time all functions normal. Animal killed forty-four days after operation. Point of operation four feet below the pylorus. The invaginated portion atrophied and retracted to such an extent that the bowel at this point only presents a thickened ring with its lumen only slightly narrowed by a circular ridge of mucous membrane. Omental flap firmly adherent all round and greatly atrophied.

REMARKS.—In circular enterorrhaphy, as in cases of intestinal wounds of any kind, the ideal of any operation should be to bring in continuous uninterrupted apposition a large surface of serous membrane, without, at the same time, interfering with the vascular supply of the parts which it is intended to bring together for permanent union by cicatrization. If in employing the Czerny-Lembert sutures more than a few lines of the margins of the bowel is inverted and included between the two rows of sutures, there is great danger of causing primary traumatic stenosis by the projecting circular ring in the lumen of the bowel. The narrowing of the lumen of the bowel must be as great, if not greater, than after invagination. That the second row of sutures has often been the cause of gangrene of the inverted margin of the bowel would not be difficult to prove by many post-mortem records and specimens. By invaginating to the depth of a quarter or third of an inch accurate coaptation is secured of the corresponding serous surfaces between the intussusceptum and intussusciens, which is made more secure and effective by the elastic pressure exerted by the rubber ring. This method of coaptation furnishes a large peritoneal surface of peritoneum for immediate union by cicatrization. With perhaps one exception, all of my experiments have shown that when cat-gut is used for invagination sutures none of the failures were at-

tributable to their presence. On the inner side of the bowel the rubber ring is drawn against the puncture, and would thus furnish a mechanical protection against the escape of fluids along these minute canals; besides the swelling of the catgut where it becomes softened by the fluids of the tissues would most effectually plug the punctures until a permanent plug is furnished by the granulations which in time completely remove the catgut by substitution and close the punctures permanently by a minute cicatrix. One great advantage of the rubber ring consists in its furnishing absolute protection to the bowel against pressure by the invagination sutures during the invagination, and subsequent traction from peristaltic contraction should the latter cause tension of the sutures, an occurrence which is not likely to arise if the invagination has been properly done. A circular enterorrhaphy as described above can be done in 15 minutes which certainly compares very favorably with any other procedure as far as time is concerned. In the description of a number of the specimens it has been distinctly stated that injurious results followed the stenosis caused by the invagination, and this might be urged as an argument against the safety and applicability of the operation. As compared with the human subject the dog is an unfavorable animal for circular enterorrhaphy by invagination. In the first place, the walls of the bowel are much thicker in proportion to its lumen than in man, a condition which necessarily seriously affects the lumen of the intussusceptum. Again the dogs were allowed to eat what they desired before and after the operation, and the quantity was not limited, consequently a great deal of indigestible substances, often of the coarsest kind, as straw, fragments of wood, or bone, hair, etc., found their way into the intestinal canal, and in a number of cases were arrested at the point of narrowing in the bowel, where they gave rise to the formation of an enterolith. In one instance death resulted clearly from intestinal obstruction from such a cause. In men the coats of the bowel being thinner and the lumen correspondingly larger, invagination is done with greater ease, and the danger from stenosis could hardly come into question as the fluid contents of the small intestines would pass readily through the rubber tube.

Some of the older specimens prove that the traumatic stenosis caused by the invagination gradually diminishes by atrophy of the invaginated portions which finally only appear as a prominent ridge of mucous membrane on the inner surface of the bowel, the remaining coats having completely or nearly disappeared by retrograde metamorphosis and absorption. In the healing of all wounds one important condition for an ideal result is rest. The rubber ring in the intussusceptum secures this important condition for the invaginated portion, as the elastic pressure must overcome peristaltic action and secure for this segment of the bowel, as near as possible absolute physiological rest. The danger of stenosis after invagination is greatest as soon as inflammatory swelling makes its appearance, a day or two after the operation, and the rubber ring is again in the right place to prevent any undue swelling by affording a gentle support for the invaginated portion, which cannot fail in preventing undue venous engorgement and œdema, which would otherwise follow the invagination. It serves both the purpose of a splint and an elastic bandage. After union of a bowel by invagination with a rubber ring peritoneal sutures are superfluous as the invagination itself most effectually prevents any escape of intestinal contents by the valvular action of the invaginated portion; at the same time the serous surfaces are kept in permanent and uninterrupted contact by the elastic pressure on part of the rubber ring.

Although the experiments have demonstrated the safety of the catgut invagination sutures in operating upon dogs, the same innocuity might not attend operations after intestinal resections for obstruction, as in such cases the coats of the bowel are almost without exception very much attenuated, and consequently the danger of extravasation along the needle punctures would be increased. Very recent trials have satisfied me that invagination after circular resection can be done with the rubber ring with facility and probably greater safety by dispensing with the invaginating sutures and adopting the following plan: The lower end of the intussusceptum is lined with a soft rubber ring about one quarter to one third of an inch in width, and its lumen of sufficient size to afford

free transit to the intestinal contents. The lower margin of the ring is stitched to the end of the intussusceptum by a continued fine catgut suture. The ends of the bowel are now brought in contact and fastened together with four catgut sutures which are placed equidistant from each other. Invagination is now made by gently pushing the ends of the bowel in opposite directions being careful to push the ring sufficiently deep so that its upper margin is grasped by the neck of the intussusciens. A few superficial sutures are applied simply for the purpose of preventing disinvagination: the four catgut sutures act as invagination sutures, and at the same time prevent ectropium of the mucous membrane of the lower end of the bowel during and after invagination. With proper facilities and good assistance, a circular enterorrhaphy can be made in this manner without using invagination sutures in ten minutes, and by using not more than four retention sutures the blood supply to the inverted portions is not impaired, and at the same time the two ends of the bowel have been joined together by a large surface of peritoneum, which is held in accurate contact for rapid union by granulation and cicatrization. The advantages that are derived from covering a sutured intestinal wound by an omental flap are self-evident. The procedure is simply an imitation of nature's process in protecting the peritoneal cavity against perforation and in hastening the healing of the visceral wound. An adherent omentum secures rest for the part to which it has become attached. As the omental flap becomes firmly adherent before definitive healing of the visceral wound has taken place, it furnishes additional protection, and in the event of a small perforation it guards against perforative peritonitis by mechanically preventing the entrance of pus into the peritoneal cavity. Should pus reach the omental flap after it has become firmly adherent it is not very probable that perforation would take place through the two layers of peritoneum furnished by the adherent omental flap, and the subsequent healing of the perforation of the bowel would be most likely to take place. I shall again refer to this subject under the head of "Omental Grafting."

IV. INTESTINAL ANASTOMOSIS.

By an intestinal anastomosis we understand a condition of the intestinal canal where on account of an obstruction or complete occlusion, the intestinal contents are directed into a segment of the bowel below the seat of obstruction or occlusion through a fistulous opening between the bowel above and below the seat of partial or complete occlusion. The idea of establishing such a communication between the bowel above and below the seat of obstruction originated with Maisonneuve, who, without testing the new procedure first on animals, operated on two cases, but as the result in each case was fatal, he seems to have become discouraged and abandoned the operation, and never published the communication on this subject which he had in preparation. In the Surgical Society of Paris, his proposition met with violent opposition from his contemporaries, who argued that the excluded portion of the intestine would become the seat of fæcal accumulation, which, even if the operation were a success would subsequently destroy the life of the patient. The subject was revived in 1863 by Hacken, who under the directions of Adelman made some experiments on dogs. For a long time the operation was completely forgotten until E. Hahn, of Berlin, very recently alluded to it again in commenting on his two cases of excision of the colon where circular enterorrhaphy could not be performed, and where an artificial anus was established. Both patients recovered from the operation, but all attempts to close the preternatural opening proved futile. The results of my experiments have shown conclusively that the fear of accumulation of fæces in the excluded portion of the intestine, that is the intervening portion containing the seat of obstruction and extending on each side as far as the new opening by which the anastomosis has been established, is unfounded. If this objection can be laid aside, it becomes evident that the operation of establishing intestinal anastomosis has a great future, and will soon become an established procedure in the treatment of intestinal obstruction, and as a substitute for circular suturing in some forms of injuries of the intestines, which require excision. When I first made my experiments of establish-

ing intestinal anastomosis, I made the operation by making an incision an inch and a half to two inches in length through the convex surface of each bowel, and sutured the wounds together by Czerny-Lembert sutures the same as in making a circular enterorrhaphy. The results soon showed that the operation was attended by the same dangers as suturing after circular resection, that is, gangrene of the margins of the bowel and perforation. Dr. M. E. Connel, Superintendent of the Milwaukee County Hospital, suggested the use of perforated plates for making the lateral apposition in place of suturing. A few crude experiments were made with perforated discs of lead, wood, gutta serena, and leather, and the results soon satisfied us of the expediency and greater safety of uniting the intestines in this manner. Although the first experiments were very imperfect, and faulty in technique, almost every animal recovered. In the first experiments no needles were used. Around the oval perforation four catgut or silk sutures were tied; a slit was made in the bowel on the convex side parallel with its axis and large enough to permit the passage of a plate about an inch in width and about 2 1-2 inches in length. After making the incision and introducing the plate above and below the seat of obstruction the two wounds were brought into apposition, and the corresponding strings tied together with sufficient firmness to bring the flattened surfaces into accurate coaptation. The threads were cut short and the ends pushed inward out of sight. Experience showed that although the apposition was good, a tendency was observed on the part of the margins of the wound to evert on account of the bulging of the mucous membrane. I consequently modified the operation by arming the lateral threads with a needle with which the margin of the incision about the middle of the wound was transfixed. This proved a step in the right direction, as the lateral sutures completely prevented eversion of the margins of the wound, at the same time they fixed the plates in their position, and lastly at once transformed the longitudinal slit into an oval foramen of sufficient size for the free passage of intestinal contents. After many trials with different kinds of materials for the plates, I came to the conclusion that decalcified or partially decalcified

bone plates preserved after the decalcification in pure alcohol served the best purpose.

DIRECTIONS FOR PREPARING BONE-PLATES.

The compact layer of an ox's femur or tibia is cut with a fine saw into oval plates, one-fourth of an inch in thickness, two and one-half to three inches in length, and an inch in width. The plates are then decalcified in a ten per cent solution of hydrochloric acid, changed every twenty-four hours until they have become sufficiently soft that they can be bent in any direction without fracturing. After decalcification they are washed by letting water flow over them from three to six hours so as to remove the acid. The plates are then covered with porous paper and compressed between two pieces of tin until they are perfectly dry. If during the process of drying the plates are not compressed between two smooth surfaces they become distorted by warping. The hardened plates are next drilled several times in a straight line in the centre, and the openings enlarged and connected with a file, until the perforation is five-eighths inch in length and about one-eighth to one-sixth inch in width. The sharp margins of the plate and perforations are removed with a file. With a fine drill the four perforation for the sutures are made near the margin of the oblong perforation, one at each end and one at each side. For preservation the plates are kept in absolute alcohol. When the plates are to be used they are washed in a two per cent solution carbolic acid, and the threads or sutures attached by threading two fine sewing needles, each with a piece of aseptic silk, twenty-four inches in length, which are tied together. The threads are then fastened to the surface of the plate by another thread passing through the perforations in the shape of a loop and fastened at the back.

Instead of describing the experiments in their chronological order, I will enumerate them according to the part of the intestine operated upon, commencing with the lower portion of the intestinal tract.

I. GASTRO-ENTEROSTOMY.

As gastro-enterostomy is an operation which establishes an anastomosis between the stomach and the upper portion of the intestinal canal, with exclusion of the duodenum, and sometimes a portion of the jejunum, and is performed in cases of obstruction in the pylorus or duodenum, it comes within the legitimate sphere of this paper. Gastro-enterostomy, as heretofore described and performed, is an operation attended by many difficulties, and requires even in the hands of an expert an hour or more for its execution. As this operation is only done in cases greatly debilitated by disease and long suffering, anything which will simplify the technique and shorten the time must be looked upon as an improvement. An operation that can be done in ten minutes instead of an hour or two, and which even furnishes better conditions for the healing of the visceral wounds must take the place of the more complicated procedures which so far have only been practised in the hands of the most experienced surgeons.

Experiment 52. Dog, weight 25 lbs. Incision made through linea alba from xiphoid cartilage to near umbilicus. Omentum pushed to one side, and the stomach drawn forward into the wound; near the middle of its anterior surface a longitudinal incision was made, two inches in length, and a perforated gutta percha plate to which four medium-sized juniper catgut sutures were attached, was introduced. The lateral sutures, armed with needles, were passed through the entire thickness of the walls of the stomach, half way between the angles of the wound. A similar incision was made into the intestine at the junction of the duodenum with the jejunum: the same kind of plate introduced and the margins of the wound punctured by the lateral armed sutures when the two wounds were brought *vis a vis* and the corresponding sutures tied. In tying the sutures the lower lateral suture is tied first, and the threads cut short; next the sutures corresponding to each angle of the wound are tied, and lastly the upper lateral. The serous surfaces of the stomach and intestine over an area corresponding to the size of the plates were brought into accurate permanent contact by the tying of the sutures. The stomach was replaced and the abdominal wound closed. The animal was allowed to eat immediately after the operation, and manifested no signs of illness

or pain, and was killed seven days after operation. Abdominal wound healed. Omentum adherent to its inner surface. Union between stomach and bowel firm over the entire surface of approximation. Plates detached, the one in the bowel had passed, while the other was found loose in the stomach. The new opening large enough to pass the index finger.

Experiment 53. Dog, weight 50 lbs. The operation was performed in the same manner as in the previous experiment, but great difficulty was experienced in bringing the stomach forward, as this organ was distended to its utmost with an enormous quantity of solid food. Evacuation was effected through the incision, aided by attempts of the animal to vomit, the violent contractions of the stomach forcing the food toward the opening, from where it was removed with fingers and spoon. After the stomach was emptied it was washed out with warm water. For the stomach a bone plate, only partially decalcified, was used, while the approximation plate in the bowel was fully decalcified. The four approximation sutures were of catgut. Several portions of omentum, which were soiled during the emptying of the stomach, were excised. The abdominal cavity was thoroughly irrigated with warm water before the wound was closed. The animal died the next day, and on opening the abdomen it was ascertained that the immediate cause of death was hemorrhage, as the peritoneal cavity was filled with blood. The bleeding undoubtedly took place from the omentum, by slipping or loosening of one of the catgut ligatures.

Experiment 54. Medium sized dog. Operation performed in the same manner with decalcified bone plates and catgut sutures. The first two days the animal had several attacks of vomiting, subsequently showed no signs of suffering. Appetite good and stools regular. Killed 34 days after operation. Omentum adherent to inner surface of abdominal wound. At point of operation stomach is contracted, so that the organ presents an hour-glass appearance. Interior of the organ contains a large mass of hay and fragments of bone. New opening large enough to pass index finger. Union between stomach and bowel over entire surface of approximation. Water passed into the stomach, flows through the pyloric orifice and the new opening in a stream of equal size.

Experiment 55. Large bull-dog. Approximation of anterior surface of stomach with bowel by perforated gutta percha plates, and four catgut sutures. Length of visceral incisions, two inches. The day after operation animal vomited his dinner, subsequently no unfavorable symptoms. Animal killed fourteen days after operation. Abdominal

wound well united. Omentum adherent to wound, duodenum, liver and at point of operation. Firm adhesions between stomach and bowel. Water passed into the stomach, only passed through the pyloric orifice. On opening the stomach, it was found that the wound in the stomach and intestine had completely healed, the site of incisions being marked by a narrow firm cicatrix. The failure of obtaining an anastomotic opening between the stomach and intestine could only be attributed to one of two causes, viz., either the perforations in the plates were too narrow, or the needles of the lateral sutures included too much tissue; either cause would bring about approximation of the margin of the wounds and permanent closure of the opening by granulation and cicatrization.

REMARKS.—All of the animals recovered, except in case of experiment 53, without any untoward symptoms, although they were allowed to eat immediately after the operation, and the diet was not selected or restricted at any time. In the fatal case death was caused from complications which had no connection with the gastro-intestinal opening. In all of the specimens examined the mucous membrane of the stomach and intestine which had been interposed between the approximation plates presented a healthy appearance, showing that the pressure of the plates had exercised no injurious effect on this structure. More recent experience with this operation on animals has revealed the fact that in the stomach a completely decalcified bone plate is digested almost completely in thirty-six to forty-eight hours. It would, therefore, appear advisable to use only partially decalcified bone which remains for a longer time, so that in case of delayed union the approximation would be maintained for a sufficient length of time. As these animals subjected to the operation recovered promptly, and under the most unfavorable conditions, we have every reason to believe that this operation will be attended by the same favorable results when done for pyloric or duodenal stenosis in man, where a careful preparatory and after treatment cannot fail to facilitate the operation and to improve the conditions for the formation of early adhesions and a speedy definitive healing of the wound. I have no hesitation in recommending it as a substitute for the more time-consuming and

less certain operation by the tedious and difficult method of double suturing which is now generally practised.

2. JEJUNO-ILEOSTOMY.

In this operation some form of intestinal obstruction, either complete by division of the bowel and closure of both ends, or partial, by making a volvulus, invagination or flexion in the vicinity of the juncture of the jejunum with the ileum, and intestinal anastomosis made by establishing a communication between the bowel above and below the obstruction. Before I made use of the perforated approximation discs this was accomplished by making an incision an inch and a half or two inches in length through the convex surface of the bowel above and below the obstruction and uniting the wounds by a double row of sutures. An operation of this kind usually lasted over an hour, while the rapid operation of coaptation by perforated discs seldom took more than fifteen minutes.

(a) JEJUNO-ILEOSTOMY BY SUTURING.

Experiment 56. Large cat. Invagination of ileum into ileum in a downward direction, and fixation of intussusceptum to neck of intussusciens by two fine catgut sutures to prevent spontaneous reduction. Intestinal anastomosis by establishing an opening an inch in length, suturing by Czerny-Lembert method. The animal never recovered from the shock of the operation, and died in less than twenty-four hours. Length of intussusceptum two inches, which, after the removal of the sutures, could not be reached by traction, as the bowel was firmly constricted by the neck of the intussusciens, and recent adhesions had formed. No peritonitis: suturing found perfect.

Experiment 57. Dog, weight 65 lbs. Intestinal obstruction by making acute flexions in upper portion of ileum, fixation of loops of intestine by fine catgut sutures. Intestinal anastomosis between jejunum and ileum by incision and double suturing. The animal died on third day with symptoms of perforative peritonitis. On close examination, one of the superficial approximation sutures had been passed through the whole thickness of the wall of the bowel, and it was here that perforation had taken place. Recent diffuse general peritonitis.

Experiment 58. Dog, weight 17 lbs. Descending invagination of ileum into ileum, length of intussusceptum three inches, fixation by

two catgut sutures. Formation of intestinal anastomosis between the bowel above and below the invagination by incision and double suturing. Animal died on third day with symptoms of perforative peritonitis. Abdominal wound not united. Adhesions at point of operation quite firm. Diffuse general peritonitis from a perforation which had been made by a sharp fragment of bone above the new opening. Intussusceptum not gangrenous.

Experiment 59. Dog, weight, 23 lbs. Intestinal obstruction was made by producing a volvulus in the upper part of the ileum. Restoration of continuity of intestinal canal by making a jejuno-ileostomy by lateral apposition and double suturing. Day after operation intestinal discharges were bloody; after this time normal. Animal in perfect health when killed sixty-seven days after operation. The volvulus was found in same condition as after operation; the intestinal loop empty, atrophied and adherent to adjacent loops of intestine. Bowel above seat of obstruction and as far as the new opening empty. Intestinal tract above and below the obstruction presents no indication of the presence of an obstruction. New opening oval in shape and as large as the lumen of the bowel at that point.

Experiment 60. Large maltese cat. Intestinal obstruction by making two flexions in ileum, about eighteen inches apart, after this portion had been cleared of its contents. Flexions made by doubling the bowel toward its convex side, and fixing it in this position by fine catgut sutures. Jejuno-ileostomy by lateral apposition and suturing. Vomiting day after operation; stools scanty the first few days, and later complete obstruction. Died nineteen days after operation. Wound completely united; no general peritonitis; flexions remained; bowel between them contained a slight amount of fæcal matter. Bowel some distance above the new opening very much dilated, pointing to obstruction above new opening. On tracing the intestinal canal from above downward, this obstruction is seen to consist in acute flexion of the bowel by firm and extensive adhesions. New opening sufficiently large to admit the tip of the index finger, around the margins of which most of the deep sutures remain attached.

Experiment 61. Large cat. Obstruction made by two flexions in the ileum, the apices of which were united by catgut sutures. Intestinal anastomosis made by a jejuno-ileostomy. For eleven days the animal remained in good condition, when symptoms of perforative peritonitis manifested themselves, and death ensued two days later. External portion of wound not united. Numerous omental and intestinal adhesions. Flexions retained and their apexes adherent to each

other by firm band of adhesion. Excluded portions above and below the obstruction empty. Two small perforations at point of suturing on anterior surface of bowel; remaining portion of wound firmly united. New opening sufficiently large to admit tip of index finger. Death from perforative peritonitis.

Experiment 62. Large, Newfoundland dog. Descending invagination of ileum into ileum to the extent of six inches; fixation of intussusceptum by two catgut sutures. Permeability of intestinal canal restored by making a jejuno-ileostomy; wounds united by a double row of sutures. Intestinal discharges normal throughout. No rise in temperature. General condition as good as before operation, when killed on the twentieth day. Abdominal wound completely united; no peritonitis; omentum adherent at site of operation. Invagination had reduced itself, and its location was marked by an acute flexion caused by extensive adhesions. No accumulation of intestinal contents in excluded portions. The new opening, at least two inches in length, a few of the deep sutures remaining attached to its margins. This opening was partially obstructed by a mass of hair and fragments of bone. On passing a stream of water from above downward, the fluid passed through an opening in the centre of this mass into the lower portion of the ileum, but not through the portion that was invaginated. After this mass was removed, the fluid was found to pass through the portion that was invaginated, as well as through the new opening.

(TO BE CONTINUED.)

ŒSOPHAGOTOMY FOR THE REMOVAL OF AN INGESTED FOREIGN BODY.¹

BY W. C. FREW, M. D.,

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ON Sunday, May 26, 1887, Dr. A. M. Dent, of Coshocton, was called to see Jacob Miller, aged 24, by occupation a burglar, then an inmate of the county jail, who said that two hours before he had accidentally swallowed a piece of glass, which he described as part of a broken bottle, irregular in shape but about the size of a half dollar, and that he believed that it had lodged in his œsophagus. He complained of constant pain and great soreness about an inch above the sternum, which was greatly aggravated when he attempted to swallow and he expectorated a small quantity of bloody mucus. He could swallow fluids with great difficulty, but could not swallow solids at all,

Being a prisoner confronted by the penitentiary, Dr. Dent suspected him of malingering, or a least of exaggerating as to the size of the glass, and the severity of his symptoms. In order to settle the question whether or not the glass, if it had been swallowed, still remained in the œsophagus, or whether it had passed into the stomach, wounding the mucous membrane of the tube as it went down, a probang was brought into requisition. But on attempting to throw the head back it was found impossible to do so on account of the rigidity of the muscles caused by the intense pain which that motion occasioned. This, together with the violent reflex action resulting in gagging and retching which the introduction of the probang into the throat induced, rendered the attempt entirely unsuccessful.

On Tuesday, at Dr. Dent's request I saw the patient with him. After making several unsuccessful attempts at passing various instrument into the œsophagus, we tried painting the pharynx with a strong solution of cocaine, but this rendered us no assistance. We then administered the A. C. E. mixture

¹Read before the Muskingum Valley Medical Association, August 20, 1887.

and renewed our efforts, but we could not so completely anæsthetize the patient with this mixture as to be able to throw the head back or to prevent the paroxysms of gagging, which seemed as violent as when no anæsthetic was used.

On Wednesday I made a probe consisting of a very flexible steel shank to one end of which a polished oval steel bulb about half an inch in diameter was attached, while to the other, was fixed a small tin cylinder to serve as a handle and act as a sounder. With this instrument, and with the patient profoundly under the influence of pure chloroform, the glass was found at a point about one inch above the upper end of the sternum.

During the administration of the chloroform, the patient suddenly stopped breathing. Dr. Dent then informed me that the heart had ceased beating. We had had so much trouble with the patient on account of his struggling that I had remarked to my assistants some time before, that I believed that he could be resuscitated, if dead, by running something down his throat, so that when death was apparent I was not alarmed, but seized the opportunity to pass the probe into the œsophagus and down to the foreign body. Sure enough it had the desired effect, for no sooner had the end of the probe reached the œsophagus than he began to struggle as before. This was at ten o'clock on Wednesday evening.

On Thursday at 2 P. M., assisted by Drs. Dent and Carr, I performed œsophagotomy and removed the glass without much difficulty. My incision extended from one inch above the sterno-clavicular articulation on the left side to the upper border of the thyroid cartilage. The upper edge of the glass was found on a line with the lower angle of my incision. A sharp point which projected from the glass had penetrated the whole thickness of the œsophagus, and it was probably this which caused such intense pain on swallowing or on attempting to throw the head backwards.

The superior thyroid artery was divided in the upper part of the wound and ligatured with catgut. While working with the handle of the scalpel in attempting to expose the spicule of glass which I could feel projecting through the œsophagus, the inferior thyroid artery was divided, I suppose, by be-

ing pressed against the sharp edge of the glass. It was taken up and ligatured with catgut. But little blood was lost during the operation.

The œsophagus was found, contrary to expectation, to be a firm cylinder, looking exactly like a cylindrical muscle. I made an incision into it and about one half an inch in length. The glass, which was a little more than an inch in width, on the side next to me, came out easily, showing that it had already made an incision of which mine was merely an extension. The exact size of the foreign body is shown in the cut.

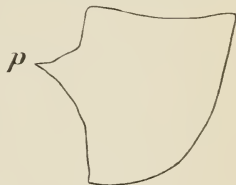


FIG. 1. EXACT TRACING OF THE BIT OF GLASS REMOVED.

It was about one-tenth of an inch in thickness and but slightly curved. The wall of the œsophagus was, I should judge, about one-fourth of an inch in thickness. The œsophageal wound was closed with continuous catgut suture. The external wound, after being thoroughly cleansed was closed with interrupted silk sutures.

The patient was nourished by enemas of milk every four hours, to which morphine was added to procure rest. Nausea and occasional vomiting caused a good deal of uneasiness during the first twenty-four hours. There were frequent paroxysms of pain evidently caused by contractions of the muscular coat of the œsophagus. During this time the pulse did not go above 100 and the temperature was below 100°F. He was allowed to take small pieces of ice into his mouth to allay thirst. Friday evening his pulse was 88 and temperature 99.4° F.

At 3 o'clock on Saturday morning we were called and found that he had vomited about one-half pint of dark grumous blood. At first we were of the opinion that it was blood which had remained in the stomach since the operation, but he soon threw up more which was of a brighter color, and as his pulse ran up to 120°F. and as he became very pale and much prostrated, we concluded that hemorrhage was still going on. The external wound had healed by first intention, but we reluctantly tore it open down to the œsophagus. (On careful examination no bleeding vessel could be found; the hemorrhage had

evidently ceased spontaneously, but the inferior thyroid which had been divided near the wound in the œsophagus was found and ligatured with silk. The wound was again closed with sutures.

At 6 A. M. Saturday the pulse was 132, temperature 100.4° F. Whiskey was added to the enemas of milk. He vomited a little blood twice during the day, but was in better condition in the evening than in the morning, his pulse having fallen to 100 and his temperature to 98° F.

He passed a comfortable night, and on Sunday morning his pulse and temperature remained the same as on the evening before. The injections of milk and whiskey were continued. In the forenoon he took several swallows of tea mixed with cream, a portion of which escaped through the wound.

About noon a profuse hemorrhage from the wound occurred. Dr. Dent again administered chloroform, and I again opened the wound. The hemorrhage was so profuse that it was very difficult to find its source. By seizing the tissues both above and below the point from which the hemorrhage came with Tait's scissor-forceps and drawing them partly out of the wound, I discovered the end of the bleeding vessel, seized it with the common artery forceps, and ligatured it securely with silk. The wound was then left open.

At this time the patient was exceedingly weak, his pulse being 150 and scarcely perceptible. He had taken no nourishment by the stomach for one week, had been anæsthetized five times during that week, had suffered much pain and had lost a great deal of blood. We decided to practice transfusion to save him, if possible. We quickly procured a piece of rubber tubing, to one end of which we attached a funnel and to the other a large aspirator needle. I exposed the radial vein just above the wrist, (those higher up could not be seen), introduced the needle into it, the tube and needle having been filled, and into the funnel held four feet above the level of the arm Dr. Dent poured a pint and a half of warm water containing 75 grains of chloride of sodium, 37½ grains of carbonate of sodium and 3 grains of phosphate of sodium.

A decided increase in volume of the pulse was immediately perceptible, and the profound depression soon began to disap-

pear. Four hours after the transfusion the pulse was 120, moderately full and strong, and the patient expressed himself as feeling stronger.

Enemata of milk were continued, but at no time since they were begun did they seem to afford him much nourishment, as he did not retain them long. During the whole time, even when the injections were suspended, he had frequent desire to go to stool. When allowed to get up he would sit and strain as long as the nurse would permit.

On Monday his pulse was 110, temperature normal, tongue dry. Had had a restless night. Was given small doses of calomel and morphine, which produced quiet sleep, and on Tuesday caused the bowels to move several times. The discharges consisted of a dark, reddish, grumous material, which was doubtless chiefly blood which had passed through the intestinal canal. The pulse now ranged from 120 to 130 and the temperature from 97° to 98°F. The patient was now required to take a half glass of milk every three hours. The act of swallowing was accompanied by a great deal of pain, and a portion of the milk escaped from the external wound, so that the patient, although hungry and thirsty, almost rebelled against our orders. There seemed also to be a paralytic condition of the pharyngeal muscles, for a portion of the milk was expelled through the nose. This latter complication existed for but one day.

On Wednesday, the seventh day after the operation, the patient took milk freely, and ate ice-cream. Probably one-fourth of what he swallowed escaped through the wound in the neck.

From this time on, recovery progressed without any interruption. About one month from the date of the operation the wound had entirely healed. The prisoner gained flesh and strength rapidly, and is now in much better condition than he was before he swallowed the glass, for one week ago he escaped from the jail in broad day light, distanced all of his pursuers, and has since escaped capture.

The recorded cases of œsophagotomy, according to Ashurst, number 65 with 52 recoveries. Poulet says that œsophagotomy for the removal of foreign bodies has been practiced about 40 times, but does not give the results. Aitkin, ac-

according to J. Kelly Barton of Dublin, in an article in the *ANNALS OF SURGERY* Vol. vi, No. i, July, 1887, page 22, has collected 36 cases with 27 recoveries.

I would suggest that, in this operation, the cervical vertebræ be used as a guide instead of the trachea, which is necessarily drawn to one side by an assistant. After the skin and superficial fascia are divided, the vertebræ can be distinctly felt through the remaining tissues, and when their latero-anterior surfaces are exposed, the œsophagus is very readily found.

A CASE OF NEPHRORRAPHY FOR FIXATION OF A FLOATING KIDNEY.

BY DEWITT G. WILCOX, M.D.

OF BUFFALO.

THE condition known as floating or movable kidney is one not infrequently met with. This organ being held into position by a very considerable layer of loose areolar tissue and having a movement of its own varying from one-half to one inch, it is not so surprising that during a very severe strain or from some outside influences, it should be torn from its moorings to such an extent as to be distinctly outlined immediately beneath the abdominal wall. Patients with such a condition of this gland may go for years without any apparent distress or inconvenience, and without any abnormal urinary symptoms. More frequently, however, the displaced gland is the seat of frequent neuralgic pains, and produces a dragging feeling when the patient is wearied.

The operation known as nephrorraphy, consisting of cutting down upon and exposing the kidney and then stitching it to the edges of the wound is comparatively recent. Hahn, of Germany, has the credit of first successfully performing it. Other surgeons have followed in the line—Dunning, Ceccherelli, Weir, Agnew, Esmarch, Gardner, Newman, Stevenson and Jusie all report successful cases. The following case came under my own observation in June, 1887.

Sarah W., æt. 24. About 9 years ago, while lifting heavily, felt something "give way in her back." A few weeks after, she detected a distinct tumor in the abdomen a little to the right and on a level with the umbilicus. She suffered but little pain, but was worried over its presence. She consulted a number of physicians in England where she was then living, but gained no satisfactory information regarding her trouble.

As time went on she began having pains in the "tumor" and a heavy dragging sensation. There were no urinary symptoms; in fact, the foregoing history was about all the subjective symptoms that could be elicited.

Upon examination, the "tumor" was found to be somewhat larger than an ordinary sized kidney, was quite freely movable and could be crowded up to the under edge of the liver or pushed down to the iliac region and even on to the left side; it was somewhat painful if squeezed. It was with some difficulty forced back into its normal position. The diagnosis of floating kidney was rendered.

Dr. J. T. Cook saw the case soon after and upon a thorough examination came to the same conclusion.

An operation for fixation of the displaced kidney having been determined on, the patient was anæsthetized and turned well on her sound side. The skin was shaved and scrubbed with bichloride solution. A free incision was then made midway between the last rib and the crest of the ilium, extending from the anterior edge of the quadratus lumborum forward for about four inches. After controlling all hemorrhage, the incision was continued through the entire wall, the hand inserted and the kidney grasped and brought out to the lips of the wound. Here it was held with some difficulty, as so long a time had elapsed since it had been in its natural place, that it required some stretching of the tunica adiposa to retain it. After bringing it to the opening, examining its surface and demonstrating its bloodvessels, there was left no doubt as to its being a kidney. A heavy catgut suture was passed through the perirenal fat and each lip of the incision; this was repeated three times, till the gland was securely anchored to the wound.

The remaining portion of the incision was loosely drawn together and allowed to heal by granulation. It was dressed with the usual antiseptic precautions, and the patient put to bed.

She made an excellent recovery, the temperature at no time going above $101\frac{1}{5}^{\circ}$ F. She is now able to walk quite a distance and do ordinary light work.

The gland has kept its position and there is no pain or dragging, neither have there been any untoward urinary symptoms.

From all the reports on record which I have been able to gather, the operation seems to have been successfully performed a sufficient number of times to establish it as a justifiable and practical operation. Yet, according to Ransohoff, but twenty-two such operations are on record.

EDITORIAL ARTICLES.

ON CANCER AND CANCEROUS DISEASES.¹

Sir James Paget thinks that we may justly hope to find a remedy for cancer in the constant, careful study of the likeness of these diseases to those of which we already have means of useful treatment, and that we may be the more hopeful, because the nearest likeness to cancer and cancerous diseases are to two other groups of diseases concerning which there have been in recent times very useful additions to our knowledge.

These groups are, respectively: (1) innocent tumors, and (2) the specific and micro-parasitic diseases.

The peculiar method of growing, purposeless and, as it were, selfish is characteristic of both innocent and cancerous tumors, and seems to indicate a very close affinity between them. It is very rarely seen in any other disease except certain specific ones.

It is also impossible to mark any fair boundary line between innocent and cancerous tumors. The space between, *e. g.*, a common fatty tumor and a cancer of the tongue is bridged over by intermediate forms.

Year by year, in Sir James Paget's opinion, accumulating evidence tends to prove that "each specific disease is due to the influence of a distinct morbid substance on some part or parts at which the characteristic signs of the disease can be and are manifested. Two conditions must coincide in each; the one general or diffused in a morbid material in the blood; the other local, in some part with which this material produces disease." He uses the term "morbid material," for

¹The Morton Lecture at the Royal College of Surgeons of England, 1887. By Sir James Paget, Bart. F. R. S., etc.

caution's sake, but the context shows that it is a micro-organism which he has in view.

The group of specific diseases by which the conformity of cancers and cancerous diseases may be best tested is "one that includes, as its chief members, syphilis, tuberculosis, glanders, leprosy and actinomycosis, each of which is known to have a distinct micro-parasite."

"Let me," writes Sir James Paget, "point out their most important general agreements. And, first, let it be observed that they are included by Virchow among tumors, under the name of *granulomata*; and I doubt whether they can be justly excluded from the list for any reasons which would not equally justify the exclusion of many of the cancerous diseases.

Certainly, a tuberculous mass such as one may find in the brain, or a jaw, has more of the general characters of a tumor than any rodent ulcer has or many cancers of the lip or tongue. It is at least evident that all these specific, micro-parasitic diseases are, in their several measures and in some of their forms, morbid growths and self-maintaining. All agree in this general character; they differ from one another in that each has a definite, characteristic and diagnostic method of growing, as shown in its shape and in its substance, both tangible and microscopic, in its relations to the structures which it involves. In these respects they differ from one another about as much as any of them do from cancer."

"Besides, in all these diseases, as in the cancerous, the morbid growths are prone to special modes of degeneration, of partial decay and of death; and then they all tend to ulceration, each with a characteristic method, shown in the shape of the ulcer, the structure of its boundaries, and its mode of affecting the parts on which it encroaches."

"And all the cancerous and the others alike are at some time infective; some by inoculation, all by invasion of adjacent parts or by the transmission of materials, through lymph-spaces, lymphatics, or blood-vessels to parts far off." Sir James Paget holds that likeness in characters so significant as the above "is evidence enough of essential likeness and close affinity in all the diseases in which they are ob-

served; and, therefore, that as we know that in tuberculosis, syphilis, leprosy, and the rest, there is for each a specific morbid material in the blood, so we should believe there is at least one in cancer and cancerous diseases."

He grants that "cancer cannot be inoculated, it is not contagious." But are there not facts recorded that render even this doubtful? However so much the better for the theory advocated.

Sir James Paget's attention has long been directed to the pathology of plants, and he has more than once urged its study as likely to throw light on the diseases of animals. Many forms of woody tumor, "xylomata," grow on various trees. Some evidently grow from buds or "sleeping eyes," as they have been termed, and thereby afford excellent evidence of the truth of Cohnheim's explanation of the origin of tumors, at least of the innocent ones, from portions of germinal tissue remaining undeveloped. On the other hand, *galls* illustrate the influence of a virus in exciting morbid growths. Of these, more than a thousand forms are known, each produced by a different material, or virus, inserted by a different species of insect. "The nature of the virus is," Sir James Paget thinks, "unknown; but so constant are its proportions, and so exactly defined, that the specific characters of each insect are not more invariable than are those of the galls which it has made to grow." It may easily be seen in the larger kinds of galls that their minute structure differs from that of the contiguous normal parts as widely as that of a cancer does from the healthy structures near it.

It is to be noted that "each insect, with unfailing instinct, deposits its egg and its virus in the leaf or other part of the very plant in which the right kind of gall can be found. Each virus requires, as we may say, a susceptible and fitting place and substance; and this is a fact confirming what we believe in the case of many specific diseases, and as I venture to say, in the cancerous. The two conditions must coexist—the specific material, microbe, virus, or whatever we may name it, in the blood which will carry it to every part, and the one appropriate part, texture, or place in which this material can produce the disease."

We cannot quite see the justification which Sir James Paget has for thus roundly asserting that cancer is, in all probability, a blood disease. To support his views he quotes tetanus, hydrophobia and fevers like scarlatina, as diseases sufficiently analogous to cancer for conclusions respecting the last-named disease to be drawn from what is known of the pathology of the others.

We think it a pity at present to in any way mix up the two perfectly distinct questions: (1). Is cancer primarily a blood disease or a local disease, and (2). Is cancer caused by a virus, such as a microbe.

The analogy made out by Sir James Paget himself between cancer and galls, an essentially local disease of plants, is at least as strong as the analogy between cancer and tetanus or scarlatina. And there are strong obvious facts opposed to the idea that cancer is anything but a local disease at its commencement. Excluding the number of cases in which small cancers have been excised and have not returned, why do all kinds of malignant diseases generally, and some kinds almost invariably, when removed and recurring, return in the locality from which the excision took place? Suppose a patient with one cancerous and one healthy breast, and suppose *both* to be thoroughly and completely removed by exactly similar incisions. If recurrence took place, would it not be a hundred to one that it would be on the side originally cancerous? But if it be really a correct theory of cancer that it is primarily a blood disease and is ultimately localised only by what may be termed local accidents, such as traumatisms, senile degenerations, etc., why should not cancer recurring after such a double operation as I have imagined be just as likely to recur in one cicatrix as in the other? It may be replied that it *is* just as likely. I envy the trustfulness of the person who should make such a reply and expect to be believed.

With regard to the heredity of cancer, Sir James writes: "The fact of frequent inheritance is sure in this as in many other diseases, but its method is so mysterious; it is so utterly impossible to conceive the form or the material in which the impregnated ovum contains that which will become or be made cancerous, that it cannot be safe or useful to deduce anything from the bare fact."

Now one essential element in the proof of the theory of inheritance in cancer is the numerical one; and it cannot be said to be very strong even now. If it should once be learned that cancer is in any way contagious (and all the arguments from analogy drawn in the paper before us, without counting clinical facts left unnoticed by it, would incline one to suspect that it may be contagious) where will then be the arguments drawn from figures in support of the theory of cancerous inheritance?

But it is, after all, not from speculation, or at least not directly from it, that we have most reason to hope for answers to the various questions concerning cancer. It is a curious circumstance that just now in England and France respectively, the two most representative surgeons of those countries should be advancing, as deductions from clinical observations, hypotheses which are in some but not all respects identical with theories which surgeons of a younger school in America and Germany claim to have demonstrated by experiment.

C. B. KEETLEY.

GASTROENTEROSTOMY IN LUECKE'S CLINIC.¹

Before the introduction of this operation by Wölfler unfortunate patients were treated symptomatically. The first complete details of operated cases were given fully in a brochure of v. Hacker, which was a collection of eight cases operated upon in Billroth's clinic. Five of these cases died from the effects of the operation, three were improved. Saltzmann, publishing a series of 23 cases, of which 18 had malignant disease, gives a mortality of twelve following the operation. Both these statistics are certainly unsatisfactory as to the ultimate promise of the operative interference. Rockwitz has collated twenty-two cases from the literature of gastro-enterostomy. Twenty-one of these were performed outside of the Strassburg clinic. Seventeen of the cases were performed for carcinoma and four for cicatricial stenosis

¹Die Gastro-enterostomie an der Strassburger Klinik, von Dr. C. Rockwitz, Assistenz Arzt. *Deutsche Zeitschrift. f. Chirurgie*, bd. xxv, hft. 6.

of the pylorus and duodenum. Nine cases recovered; of these six were cancer.

The total mortality was 57.2% and in carcinoma it was 64.7%. Eleven patients died from the immediate effects of the operation. One died four weeks subsequently of marasmus. The remaining cases survived the operation and lived months after free from symptoms. The cases of cicatricial stricture were completely cured. The uncommonly high rate of mortality is striking, and is to be attributed to different circumstances. In all, the mode of operating is no doubt an important factor. Gastro-enterostomy is in most cases easily carried out, and this seems to have been the truth as applied to the cases in the Strassburg clinic. In all, eight cases were operated upon in this clinic. In most of the patients a pylorus resection had been at first thought of, but abandoned subsequently on account of the extensive adhesions formed by the new growth. In six cases there was carcinoma of the pylorus, while in one case the stenosing pylorus tumor was of doubtful nature. Another was a case of stenosing cicatrix following an ulcer of the pylorus, with adhesions to the surrounding viscera and infiltration of the surrounding connective tissue. Six cases occurred in males. In carcinoma the ages ranged from 30 to 50 years. All the cases were in very bad condition before, but none died immediately after the operation from either collapse or peritonitis. One patient died after two weeks of inanition and pneumonia.

In all the rest the wished-for effects of the operation were speedily attained. One patient, probably suffering from a carcinomatous growth in the pylorus, lives still (1 year after operation), free from stomach symptoms and enjoys good health. The case of cicatricial stenosis, though suffering from pulmonary phthisis, is free from stomach symptoms. A case recorded by Fischer, of the Strassburg clinic, was one of carcinoma and lived one year and two months. In one case death followed 3 months after operation.

Of especial interest are those cases which came to autopsy. In one of these compression of the transverse colon was found caused by the mesentery of the coil of intestine which had been fixed to the stomach. In another the gastro-intestinal fistula was so contracted by

cicatricial and spur formations, that the avenue of entrance to the intestine was obstructed. In the third case the gastro-intestinal fistula was satisfactory. The two latter cases died of general carcinosis. The mortality in the Strassburg clinic (Prof. Lücke) was 12.5%. The above cases added to those already published from all sources give a mortality of 44.8%.

A pylorus the seat of malignant growth gives rise to few symptoms other than those found in gastric catarrh, if no stenosis be present. Once having caused stenosis, the growth threatens the life of the patient and causes dangerous stomach symptoms. Gastro-enterostomy aims to eliminate the obstruction to the passage of food from the stomach to the intestine. It does this successfully by diverting it through a gastro-intestinal fistula. The pylorus and duodenum remain inactive, but do not by this compromise the general condition of the patient. In stenosis of the pylorus of non-malignant nature the patient becomes permanently cured. Pain with the other symptoms disappear after operation.

Gastro-enterostomy is only indicated in those cases where radical cure is not possible; it does not take the place of pylorus resection in *curable* cases (pylorectomy). In slight and easily isolated malignant growths the gastro-enterostomy yields place to pylorectomy. The prognosis in cases of pylorectomy is very bad, and under the best conditions the cases which have remained free from metastases are discouragingly small in number. Of 52 cases of carcinoma *selected* for operation *only* 5 were found free from metastases. The mortality in pylorectomy for carcinoma reaches at present 75%. In this figure we find no assurance as to how many of the surviving 25% died of a return of the disease.

The indications for the one or the other operation are very difficult to lay down by absolute rule. Adhesions to the pancreas contraindicate pylorectomy. The extension of the growth over the duodenum puts great difficulties in the way of the operator (Wölfler). Adhesions of the tumor to the liver may contraindicate gastrectomy. Adhesions to the omentum, colon and the abdominal wall within certain limits are less to be feared. The greater the surface exposed by

divided adhesions the greater the danger of infection. In many cases of gastro-enterostomy we find adhesions to the liver recorded. The greater the extent of the pylorus tumor and the more the wall of the stomach is affected, the greater becomes the danger of the operation. Convinced that the operation of gastro-enterostomy was palliative in its indication, Lücke has avoided all manipulation of the new growth and its adhesions. Dr. Rockwitz considers this an element of the success attending the operation.

The operative procedures, both as to technique and duration were of such a nature as not to exhaust the powers of the patient. It is impossible to do more than touch upon the most interesting points considered exhaustively by the author. The patients must receive a thorough preparation for operation, the stomach for days previous to operation is washed out at frequent intervals. Infusion of senna is used to keep the bowels clear. On the day of the operation and an hour before operation the stomach is thoroughly washed out; just before the operation an opium rectal injection is administered in order to quiet peristaltic action. During the operation antisepsis is carried out in every detail, without spray. The abdomen is opened in the linea alba. Those cases where the stomach is divided are most favorable. The gastric fistula is in all cases contemplated at the most dependent portion of the stomach. The stomach and intestine are clamped with rubber-covered steel clamps before opening. It is not important what sutures or mode of suture is employed. The exact application of the suture is the most essential factor. Button silk suture and Lembert's peritoneal sutures were used by Lücke. Most of the patients during and after the operation remained until the following day in a condition of collapse so that all aids, camphor, wine, warmth, against this condition must be at hand.

The operation is thoroughly justifiable for several reasons: Gastro-enterostomy restores the normal avenues of nutrition. It is indicated in stenosis of the pylorus or duodenum where resection is not possible, and in all cases of carcinoma with glandular infection. Pylorus resection is contraindicated where there are extensive adhesions and glandular infections and adhesion to the pancreas. Above all

things division of adhesions, isolation, and manipulation are to be avoided in the abdominal cavity during operation.

Good preparation of the patient is essential, and the linea alba incision is most preferred and gives less hemorrhage. It matters little if the loop of intestine is not the nearest possible one to the duodenum; therefore prolonged search is to be deprecated. The most convenient and easily applied loop should be selected, merely seeing that it is of smallest possible calibre. Nothnagel's chloride of sodium test may be used to find out the direction of peristalsis. Compression of the colon by the mesentery of the sutured gut is not common or probable, and therefore complicated methods of suturing the gut to the stomach fistula (v. Hacker) should be avoided. Spur formations, etc., cannot be avoided by any of the newly proposed procedures in suturing. The peristalsis of the intestine and stomach should correspond in direction (right to left). Symptoms of disturbance of peristalsis during convalescence are best relieved by the stomach pump. As gastro-enterostomy is palliative in its aim and stomach resection curative, it is of vast importance that the correct cases be selected for either operation. The former operation plays a role similar to that of tracheotomy in stenosis of the larynx. It removes dangerous symptoms, and makes life bearable to the patient. In non-malignant growths it is curative.

HENRY KOPLIK.

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. The Toxic Effects of Iodoform, Especially in the Causation of Skin Eruptions. By R. W. TAYLOR, M.D. (New York). The author tabulates nine cases of his own, and thirteen others drawn from literature, as follows.

No.	Reported by—	Sex.	Age	Nature of Skin Lesion.	Time of Appearance.	Constitutional Symptoms.
1	Taylor.	M.	21	Intense erythema	3 hours.	None.
2	"	M.	32	Erythema scarlatiniforme.	Few hours.	Anorexia, fever, headache, and giddiness.
3	"	F.	28	Erythema erysipelatodes.	2 days.	Vomiting, diarrhœa, headache, eruptions, fever.
4	"	F.	26	Erythema multiforme.	12 days.	Fever, malaria, dizziness, and drowsiness.
5	"	M.	34	Erythema scarlatiniforme.	Second day.	None.
6	Zeissl.	M.	3	Erythema.	14 days.	High fever, vomiting, and albuminous urine.
7	"	M.	36	Erythema urticatum.	10 days.	
8	Janowsky	M.	28	Erythema.	Probably 1 day.	Fever.
9	"	M.	22	Papular erythema	24 hours.	None.
10	"	M.	31	Erythema.	48 hours.	None.
11	"	M.	24	Papular erythema.	1 third day.	Fever.
12	"	M.	48	Erythema bullosum.	Third day.	Mild fever.
13	Köster-Syke.	M.	Not given.	Erythema bullosum.	Short time.	Not given.
14	Treves.	F.	13	Papular and vesicular erythema.	14 days.	Fever, headache and giddiness.
15	Taylor.	M.	27	Eczema madidans.	1 day.	None.
16	"	M.	36	Eczema madidans.	3 hours.	Headache, loss of appetite, nervousness, and malaria.
17	Taylor & Stein.	M.	30	Eczema madidans.	Few hours.	None.
18	Putnam Hitherto unpub.	F.	About 20	Eczema rubrum.	Few hours.	Slight fever.
19	Taylor.	M.	61	Eczema madidans.	Few hours.	None.
20	Fabre.	M.	27	Eczema madidans.	24 hours.	None.
21	Fifield.	F.	Young.	Eczema madidans.	24 hours.	None.
22	Goodell.	F.	40	Eczema madidans.	9 days.	Mild delirium, weak and irregular pulse.
23	Janowsky	F.	27	Purpuric spots.	1 third day.	None.
24	Hoepf.	F.	37	Red spots.	Uncertain.	Death on 10th day; fatty degeneration of heart, liver and kidneys.

With regard to the skin eruptions produced by iodoform he remarks that the erythemata due to iodoform present many of the features of similar simple eruptions, and to those due to other drugs. Their mode of invasion is prompt, and their extension rapid. They may increase from an original focus of contact with the drug, and may extend over parts of, or over the whole body, or they may also thus begin and be met with patches which have developed in parts remote from the point of the invasion. Then, again, a more or less general erythematous rash may follow the simple act of smelling the agent, without any contact whatever. Reaching their full evolution in one or several days, they, under favorable circumstances, rapidly undergo involution, behaving much like the ordinary erythemata, except that their course is usually even more rapid.

Various forms of erythema have been noted. In some instances it is a very superficial and comparatively mild, pinkish exanthem; in others it is still superficial in character, but very deep in hue, and may be termed scarlatiniform, so great is the dermal congestion. Then, in rather exceptional cases, and usually in those presenting more or less grave constitutional symptoms, the erythema presents, in its hue and brawny feel, points of resemblance to erysipelas. While some cases have presented lesions similiar to erythema iris and erythema urticatum, others have been observed of the papular, vesicular, and bullous forms, and come under the head of erythema multiforme. The toxic action of iodoform, therefore, may show itself on the skin in all the forms of erythema.

The eczema caused by iodoform is usually of severe form and of rapid evolution. It may begin at the point of contact with the drug, or it may develop in parts far distant, or again appear in one or in several spots—such as the hands, face, and trunk—simply from smelling of the drug. Its character is pronounced from the first; much surface is rapidly involved; the erythema and infiltration go promptly on to vesiculation and the formation of a well-marked weeping surface, in all respects similar to the ordinary eczema madidans. In most cases the involution is almost as rapid as evolution, provided the toxic agent is removed. But in some instances, perhaps of debility, of marked

eczematous tendency, or of excessive idiosyncrasy, the affection shows a tendency to become chronic. It is usually very amenable to treatment.

The systemic symptoms presented in the foregoing cases varied considerably in degree. The author adopts Nussbaum's division of the symptoms of iodoform poisoning, making three degrees.

The first is comparatively mild. A loss of appetite, headache, disturbance of disposition by excitation or depression, a mild delirium or loss of memory, and sleeplessness may be observed.

In the second degree there are absolute anorexia, an intensification of the head symptoms, perhaps dementia, mania, or melancholy, weak and rapid pulse, mild fever, and emaciation.

The third degree is a continuation and intensification of the second. Such patients lie perfectly abject in sopor, with a rapid, thready pulse and a cold surface, and die in a collapse.

The systemic symptoms in the majority of cases of iodoform exanthems belong to the first and second degree. In but one case did they go on to the third degree and end in death.—*New York Med. Jour.* Oct. 1, 1887.

II. The Antibacterial Action of Iodoform. By J. A. JEFFRIES, M. D. (Boston). As the result of a large number of culture experiments the author deduces the following conclusions.

Iodoform markedly retards the growth of bacteria, and diminishes the foul orders of putrefaction.

Iodoform is not a germicide, and is, therefore, not capable of procuring asepsis of instruments, materials or wounds.

Iodoform checks secretion from wound surfaces, and by producing food famine among germs present becomes of value in wounds, where the moisture threatens the integrity of the aseptic or antiseptic dressing.—*Amer. Jour. Med. Sci.*, Jan. 1888.

III. The Infectious Nature of Traumatic Tetanus. By E. O. SHAKESPEARE, M. D. (Philadelphia). This is a preliminary report based upon a series of experiments upon animals still in progress.

Two methods of inoculation were employed, intra-cranial, after the method of Pasteur in rabies, and intermuscular—both with all antiseptic precautions, and sterilized instruments.

The inoculated material was obtained from the medulla, or cord of animals dead from traumatic tetanus. It is concluded (1) that traumatic tetanus of the horse and mule is, at least sometimes, if not always an infectious disease, transmittable to other animals, and therefore possibly also to man; and during the progress of this disease a virus is elaborated and multiplied, which is capable of producing the same infectious disease in some other animals when placed beneath the dura mater of the cerebrum. (2) This virus is contained in the medulla and spinal marrow of the animals suffering from the disease. It is like the virus of hydrophobia, capable of being strengthened in virulency by inoculation *sub dura cerebri* from rabbit to rabbit, and, like the virus of hydrophobia, is capable of attenuation by exposure for a sufficient time to action of dry air at a temperature of summer heat, and still, again, like the rabic virus, its effects are far more intense when the virus is inserted beneath the *dura-mater cerebri* than when injected beneath the skin, or between the muscles of the back.—*Boston Med. and Surg. Jour.*, Sept. 15, 1887.

JAMES E. PILCHER (U. S. Army).

IV. The Infectious Nature of Boils. Case of Pneumonia Due to the Parasite of Furunculus. By Dr. ERNEST CHAM-BARD (Paris). There has always been a popular idea that boils are catching, and it has even given rise to the saying that "one boil means nine." The theory of the infectious nature of furuncles has now been proved. There are not only arguments of a clinical order in its favor, such as the reports of epidemics of the disease, and the cases of persons who undoubtedly get it after using basins or objects contaminated by others who had boils, but there are also the results of recent bacteriological researches. A distinct microbe has been found in the pus of boils, which is constant and can be cultivated. There is a good account of it in Cornil and Ranvier's recent book. They describe it as a staphylococcus pyogenes aureus of Rosenbach, consisting of cocci

placed in twos, rarely in fours and often found grouped in large masses. In gelatine and especially in agar-agar a fine orange yellow cultivation can be produced. They do not look upon it as special to furuncles or anthrax, but find it in many suppurative affections, pyemia, osteomyelitis, and puerperal fever.

These micrococci were found in great quantities in a case which Dr. Chambard reports, and which is one which goes far to support the theory. It is that of a general paralytic who three months after his admission to the Asylum of Ville Evrard, was found to have a large carbuncle in the back. This was opened and treated locally with iodoform. The carbuncle went on spreading, and two days after the patient died from double apex pneumonia. At the post mortem the lungs were found studded with small yellow nodules the size of cherry stones, those situated near the surface forming small prominences. In some parts where they were very thick, the lung tissue was broken down and small cavities were formed. From these some caseous pus could be squeezed. The very same microbes were found by the microscope in this pus as were found before death in the pus from the carbuncle, and they were the only ones found. They were most abundant in the small hæmorrhagic patches.

The presence of these cocci shows the mistake of treating carbuncles with poultices, which by the continued heat and moisture can only tend to favor their propagation, and suggests the wisdom of an antiseptic treatment.—*Progrès Médical*, July 30, August 6 and 13, 1887.

LEONARD MARK (London.)

V. Acute Idiopathic Myositis. By Dr. E. WALTHER (Singen). This paper contains a collection of cases of acute suppurative myositis (idiopathic) and a consideration of the pathology of the affection. The author classes it among the severer inflammatory affections, peritonitis, osteomyelitis acuta spontanea, pseudo-erysipel. It is a disease of mycotic origin and, as investigations of Rosenbach show, is due to the agency of the staphylococcus aureus and albus, and streptococci pyogenes. The avenue of penetration of the infectious element into the muscle is not clear in all cases, but there are condi-

tions as severe muscular exertion, contusions, etc., which predispose these structures to the reception of these micro-organisms. Dull, severe, increasing pain, inability to use the affected muscle, swelling of the muscle and extreme tension are among the principal symptoms. One or many abscesses may form. The prognosis differs, in some cases threatening the life of the patient. Of 19 cases collated 8 ended fatally. If the patient recovers and the abscess has not been large the use of the affected muscle is gradually recovered. The most frequent complications were erysipelas and tuberculosis of the lung. The author brings forward nothing new as to pathology of the affection, quoting largely from Rosenbach. The treatment is an antiseptic treatment of suppurating areas.—*Zeitschr. f. Chir.*, Bd. xxv, hft. 3.

H. KOPLIK (New York).

VI. The Administration of Cantharides in Rabies. By M. LOUKOMSKY. This is a popular remedy in Ukraine. When an animal has been bitten by another one which is suffering from rabies, the custom is to make it eat a dry Spanish fly which has been cut up into small pieces and mixed with some bread. For two or three days afterwards it is made to drink a decoction of broom tops (*genista sagittalis*). In 1840 the author had 5 peasants under his care, all bitten by a mad wolf. One of them would not submit to the cantharides treatment and died from hydrophobia. The other four had an ointment made of cantharides applied to the bites, and internally they took two daily doses of calomel (5 centigrammes). They also took two glasses a day of an infusion of brooms and wild elder. The use of the cantharides was temporarily suspended on the appearance of any scalding in the urethra. The treatment was continued for two weeks. None of these patients had hydrophobia. The author has lately treated with equal success two persons who had been bitten by a mad dog. Three men are mentioned who had been bitten in the face and hands by a mad wolf and who were well seven months after the accident followed by the above treatment. The author's servant was also bitten four years ago by a mad dog. The wound was cauterized next day with hydrochloric acid, and the patient was given a hypodermic in-

jection of 1 centigramme of pilocarpine hydrochlorate. On the third evening 25 milligrammes more of the pilocarpine were injected. On the fourth day the patient had some sudorific administered and was made to take a Russian bath.—*Gazette Médicale de Paris*, January 29, 1887.

LEONARD MARK (London).

VII. Congenital and Acquired Hypertrophies. By Dr. PAUL WAGNER (Leipzig). Among the cases of congenital hypertrophies are those rare cases in which the hypertrophy extends over the whole of one half of the body. Ten such cases are recorded in the literature. In most cases there was a hypertrophic disturbance on the lower extremities, while the arm and hand remained less affected. In some cases the soft parts alone, in others soft parts and bones were affected. In the author's recorded case the soft parts only were involved. The case is in other respects interesting.

There were areas scattered over the body of venous hyperæmia, in other parts than those the seat of hypertrophy. It occurred in a male child, æt. 11 years. There was no asymmetry of the head, but the cheeks, the lips, and tongue were plumper on the left than on the right side. The left hand and foot were plumper and more developed in size than the right foot and hand; on both sides of the body were the spots of venous hyperæmia. The arm and fore-arm, thigh and leg of the left side were longer than those on the right side. Exact measurements are given. The extremities did not differ in length. The electrical reaction was not abnormal, nor was there any abnormalities established on the internal organs or blood-vessels of the body. The author is inclined etiologically to place the origin of these hypertrophies with the embryonal processes (Cohnheim) rather than with the nervous system. The more common variety of congenital hypertrophies involves the extremities or portions of the same. Busch divides these as above, into those involving the soft, and those including the soft and bony parts. Wittelshöfer has collected 46 cases of partial congenital hypertrophies, including 3 cases of Billroth. Fischer has observed this hypertrophy quite frequently in the Breslau clinic. The author here records also 3 cases of partial hypertrophies occurring in

Thiersch's clinic. One interesting case showing congenital makro-daktyly with syndaktyly of the second and third fingers of the left hand and absence of the fourth and fifth fingers. In one of the author's cases, as in one recorded by Fisher, there was trophic disturbance in the shape of a deep spreading ulceration on the plantar surface of the hypertrophied foot with an analgæsia dolorosa. In this case the ulceration necessitated amputation of the foot. There was in none of the author's cases a hereditary predisposition to the development of such growths. The author also discusses the acquired hypertrophies of later life, recording one case occurring in the Leipzig clinic. A woman, æt. 38, developed a rapidly increasing elongation of the fingers and toes on both sides of the body. The bones only were affected. The soft parts being free from hypertrophy, the bones were increased in their long measurement, the skin was glossy and appeared as if stretched over the bones. The soft parts were not affected, other parts of the body were not abnormal in any degree. The process, after proceeding to a certain degree, on all the bones of the fingers and toes came to a standstill after a time. The author classifies this case with others, among which is the Fritsch-Klebs case of akromegalie. In the latter case a careful microscopic examination showed an *ostitis vascularis* of an organizing and formative nature. Prognosis in a case like the author's, when the process had ceased after a time would seem to be a favorable one. The symptoms on the part of the nervous system as in author's case would require the Weir-Mitchell treatment.—*Zeitsch f. Chir.* bd. 26, heft. 3 and 4.

HENRY KOPLIK (New York).

OPERATIVE SURGERY.

I. The Use of Ligatures on the Limbs during Surgical Operations. By L. M. SWEETNAM, M. D. (Toronto). Each of the patient's extremities is surrounded at its base by an elastic ligature sufficiently to obstruct the venous, without interfering with the arterial circulation, without regard to the location of the operation. This method decreases the time and the amount of anæsthetic required to

produce anæsthesia, and lessens the after effects, and makes the operation, practically bloodless, particularly if the ligatures be applied ten or twelve minutes before the incision, and diminishes the loss of blood, while the loosening of one or more ligatures affords prompt reaction in case of collapse. Care should be exercised if the patient has a history of purpura, varicosities should be bandaged, the head should be kept low to obviate cerebral anæmia, and the wound should be watched for five or ten minutes after removing the ligatures to check after hemorrhage. The constriction may with perfect safety be kept up for two hours, but it is well to wrap up the limb to prevent serious loss of heat.—*New York Med. Jour.* Dec. 17, 1887.

JAMES E. PILCHER (U. S. Army).

II. Ignipuncture in Tuberculous Tumors. By Dr. GENZMER (Halle). In a large number of cases of tubercular glands, the author has used the platinum-cautery, after previous incision of the skin. Where they were small he introduced a fine cautery once, where larger, then a wider cautery repeatedly. In a few weeks they became smaller, even quite disappeared, so that a cure could be positively claimed. He then proceeded similarly with larger swellings, *i. e.* five cases of tuberculosis of the testicle, with entire success in 2 and diminution of the tumor in 3. He had also used it advantageously for goitre and prostatic hypertrophy.

Volkmann doubted the permanency of the result.—*Rept. of XVI Germ. Surg. Congress in Centbl. f. Chirg.*, 1887, No. 23.

WM. BROWNING (Brooklyn).

NERVOUS AND VASCULAR SYSTEMS.

I. Rupture of the Radial Nerve Resulting from a Complicated Luxation at the Right Elbow Joint, Successful Secondary Nerve Suture. By Dr. G. LEDERHOSE (Strassburg). The author records a case of traumatic division of the radial nerve with consequent paralysis of all the muscles of hand and forearm supplied by it. The patient, a woman, *æt.* 32, sustained a compound dislocation backward of the bones of the forearm at the elbow joint on the right side. There was after

reduction suppuration and consequent fixation of the forearm in the semi-flexed position, with the paralysis above mentioned. The wounding of the soft parts occurred on the right side of the elbow joint. Five months after accident the author operated, dissecting out the radial nerve, whose torn extremities were fixed in cicatricial tissue around the joint. The torn ends were pared obliquely opposed and sewed directly with silk, the nerve trunk was fixed also by sutures to the surrounding parts. Primary union. Cases of this kind are extremely rare. Hamilton or Drewitz do not mention them in any of their statistics. The soft parts are generally in these luxations injured on the inner side of the joint. It is of little moment whether silk or catgut is used in sewing the nerve. On the other hand, tension of the nerve may be provided against by fixing it as above to the surrounding structures. The first movements in the paralyzed muscles appeared from 8 to 12 months after suture of the nerve, corresponding to cases and experience of other authors.—*Zeitschir. f. Chir.*, band 25, heft 3.

HENRY KOPLIK (New York).

II. Fatal Tonsillar Hæmorrhage. By J. N. HALL, M. D., (Sterling, Colorado). A man æt. 26, had suffered from repeated hæmorrhages from the mouth, as a consequence of acute tonsillitis. Styp-tics and pressure served to control the bleeding, and the removal of a large decomposing clot from the affected tonsil did not cause a recurrence. Eleven days later, during which the patient made good progress, the hæmorrhage recurred precipitating a fatal termination within a few seconds. The patient complained a short time before his death of a swelling in his throat, and it is believed that death was due to an aneurismal dilatation of the vessel at a point weakened by ulceration.—*Boston Med. and Surg. Jour.*, Dec. 22, 1887.

III. Aneurism in Persons under Twenty Years of Age. By W. W. KEEN, M. D. (Philadelphia). This paper reports two new cases in detail, and quotes abstracts of eleven others, which added to the fifteen quoted by R. W. Parker in the *Med. Chir. Trans.* for 1884 makes a sum total of 28 recorded cases.

No.	Sex and Age	Character.	Location.	Duration.	Complications.	Operation.	Result.	Reference.
1	F., 12		Left superficial palmar arch & left ulnar.		None	Ligature of brachial after failure with rubber bandage	Cure.	Woinarski, Aust. Med. Jour., May 15, 1884.
2	M., 14		Elbow.	Few days.	Ulcerative endocarditis.	None.	Death.	Pollock, Brit. Med. Jour., ii, 1886, p. 1033.
3	F., 8	Arterio-venous	Occipital artery and right and left transverse sinus.	Few days.	Caused by exposure to sun and accompanied by meningitis.	None.	Death.	Rizzoli, quoted by Bramann, Arch. f. klin. Chir., 1886, xxxiii, p. 6.
4	M., 18		Elbow.			Injections of liq. ferri.	Cure.	Jobert, Bramann loc. cit.
5	M., 16	Vari-cose.	Popliteal.		Vein and artery had been perforated by an exostosis	Amputation.	Cure.	Boling, Bramann, loc. cit.
6	M., 20		Left iliac.	Nine months.	Syphilis.	Supposed to be a bubo and opened.	Death.	A. C. Post, N. Y. Jour. Med. & Surg., Aug. 26, 1840.
7	F., 4		Arch of aorta.		Acute pericarditis.	None.	Death.	Hutchins'n, Trans. Path. Soc. London, vol. 124.
8	1 mo.		Ductus arteriosus.		Size of a nut, filled with a clot and imper-vious.	None.	Cure.	Martin, Bull. Soc. Anat., 1827, ii, 17.
9	0		Abdominal aorta.		E doar-teritis. Size of tumor caused dys-tocia.	None.	Death.	Phänomenow, Arch. f. Gyn-ek., 1881, xvii, 133.
10	10		Arch of aorta.	At least 2 years.	Suffocative attacks	None.	Unkno'n.	Rogers, Bull. Soc. Med. des Hôp. de Paris, 1863, p. 499.
11	M., 13		Arch of aorta.		Dyspnoea; cardiac hypertrophy; vegetations of aortic valves.	None.	Death.	Sanné, Rev. mens. des mal-ad.de l'enfance, Feb., 1887.
12	F., 18	Arterio-venous.	Ulnar artery.	3 or 4 years.	Second aneurism, temporary probably of the innominate devel-oping in the chest.	Apparent cure by Es-timate bandage; ligation of ulnar.	Cure.	Present paper.
13	F., 8		Interosse-ous artery of right hand	7 or 8 years.	Appeared after a sprain of hand from gymnastics.	None.	Spontaneous cure.	Present paper.

IV. Simultaneous Ligature of the Right Carotid and Subclavian Arteries for Aneurism of the Innominate. By HERMAN MYNTER, M. D, (Buffalo). The case reported in this paper together with Ashhurst's case (*Phil. Med. and Surg. Reporter.*, July 16, 1887), added to the 38 cases collected by Rosenstirn (*ANNALS OF SURGERY*, vol. v. p. 57), makes 40 cases with 18 cures or 45% of recoveries. The author's case occurred in a woman, æt. 54, the symptoms of innominate aneurism having existed for a year and a half. The dyspnoea rapidly becoming unendurable, ether was administered, and under strict antiseptic heavy catgut ligatures were applied to the middle of the right carotid; and the third division of the subclavian outside of the scalenus anticus muscle. The patient was discharged cured 25 days later. Ten weeks after the operation no trace of the aneurism could be found, but the innominate artery could be felt pulsating, and seemed a little larger and firmer than normal.—*N. Y. Med. Rec.*, Oct 15, 1887.

JAMES E. PILCHER (U. S. Army).

HEAD AND NECK.

I. The Statistics of Tumors of the Head. By Dr. MELVILLE WASSERMAN (Heidelberg). The author has here collected 86 cases of tumors of the head, exclusive of those in and about the salivary glands. The cases are those included within the years 1877 and 1884 in the clinic of Czerny at Heidelberg. The tumors are classified under the headings of sarcomata, epulides, polypoid tumors, fibromata and enchondromata.

The ætiology of the sarcomata is obscure. In some cases the tumors developed on the site of some wart or nævus, or a trauma may have preceeded their development, but on the whole there are no positive data. Of 51 cases of sarcoma 23 were males; the ages ranged from 2 to 70 years, and the period of greatest frequency of occurrence was from 40 to 50 years. The average duration of the disease from the outset was 21 months. Operation was resorted to in 43 out of 51 cases. The disease in cases not operated upon lasted 37 months on the average. In those operated on 18 had a return of the disease and

died after an average of 18 months. The figures here show that the disease was shortened 18 months in duration by operative interference.

In all cases after a thorough extirpation of the growth the Paquelin cautery was resorted to and all suspicious foci in the wound thoroughly destroyed thereby. In 7 cases chloride of zinc, 5 and 10%, were used to cauterize the wounds. The best results were obtained in 8 cases of sarcoma of the integuments, of which 25% live still free from return of the disease 37½% had returns. One case died of intercurrent diseases without return of tumor.

There were 5 cases of sarcoma of the cranial bones, twenty of the bones of the jaw, twelve of the nasal fossæ. Of 43 cases operated upon 16% died from the results of the operation; 27.9% were permanently cured; 41.8% died with a return of the disease; 6% died of unknown causes; 6% were lost to observation.

The complete mortality of those dying after operation was 55.8%. The average length of freedom from return of the disease was 46 months in one-fourth of the cases. Histologically, there were 14 cases of round-celled and 4 spindle-celled tumor, the rest being scattered among the giant, mixed celled tumors, osteo- and melano-sarcomata, fibro-, myxo- and angio-sarcoma.

The author has collected 22 cases of epulis. The sarcomatous tumors of this class are generally of giant-celled structure. Thirteen were of this character. Two were mixed forms and are giant and spindle-celled. The ætiology is obscure. In more than one-half of the cases carious teeth were present. The upper jaw was more frequently affected than the lower. The disease is more frequent in women (14 cases), and most cases occur between the 30th and 50th year of life. The ages ranged from 5 to 55 years. The general principle of extraction of the teeth, chiseling of the jaw and subsequent cauterization of the wound with Paquelin, presented itself in all cases. The result in all cases was satisfactory, and in 3 cases only was this result not attained. Cure was recorded in 71.4%. Return of the disease in 3 cases. The mean duration in cured cases was 1½ years. In 13 cases of giant-celled tumors there were two cases of return of the disease. The prognosis on the whole is good, and the average duration of cure in Czerny's cases was 4⅔ years.

The cases of the third class classified by the author include polypoid and fibroid tumors chiefly of the nasal fossa and naso-pharyngeal space. Five polypoid tumors were operated on, one dying of meningitis purulenta. The four remaining cases survived operation. They were sarcomata.

Ætiologically, it is interesting that in three of these four cases polypi had been removed. The author thinks that rough attempts at removal of these growths may have been an inciting cause to the increased cellular growth. Four of the above cases were in women.

The prognosis in these cases is to be made with caution on account of the dangers attending operation. The mean duration of cure (3 cases) is 56 months. As for the rest of the statistics, the author admits that on account of the limited number of cases no positive conclusions can be drawn. In conclusion, he records an interesting case of enchondroma of the ethmoid bone operated on in Prof. Czerny's clinic.—*Zeitsch. f. Chir.*, Bd. xxv, hft. 4 and 5.

II. Wounds of the Head. By S. GINGER (Heidelberg). This paper discusses those cases of traumatism of the head treated in the clinic of Czerny from 1877 to 1884, inclusive. There were 90 cases of wounds of the soft parts. The treatment consisted in shaving the head, cleansing with alcohol or turpentine, followed by washing with 2% to 5% solution of carbolic acid or a 1% solution of sublimate. The wound was then sutured with silk or catgut. In severe cases a drain or two was inserted. Iodoform was then dusted on the wound and a Lister dressing applied. It is noted that of 48 incised wounds 33 united by primary union. Of six wounds with large scalp flaps, two healed primarily. In favorable cases recovery from these wounds was completed in 4 to 8 days. If the secretions of the wound were profuse the Lister dressing was discarded and open treatment with salicylic solution or 2% acetate of aluminum was adopted. Erysipelas delayed recovery in 6 cases, proving fatal in one. In 23 cases of fractures of the bones of the cranium, the parietal, frontal, and temporal regions in the order named were the seat of traumatism. The patients were brought to the hospital in a state of unconsciousness

which lasted a variable length of time. In lesions of the brain substance an approximate localization is possible in most cases.

The brain and meninges are favorable seats for the development of various forms of inflammation (meningitis, encephalitis, pyæmia), and after years an apparent recovery may be complicated by the development of a series of symptoms due to brain abscess. Such abscesses are fatal in the majority of cases. Neuroses and psychoses may develop and the more so if the local lesion in the brain takes the form of trauma of a center with formation of a cicatricial tissue. Frequent congestions, intolerance of alcoholics, localized headaches, dizziness, paræsthesias, functional disturbance of the senses, all forebode such complication of a beginning psychosis. In extensive disturbance of the brain substance and large extravasation, deep coma and complete absence of reaction was present. There was also a reactionless pupil, irregular frequent pulse, increased temperature, shallow frequent respiration, in some cases of Cheyne-Stokes' character; death occurred in these cases from cardiac failure or œdema of the lung. The treatment was a strictly antiseptic one, and narcotics, etc., were used symptomatically, but it is to be remarked that where trephining was necessary this was carried out with the mallet, chisel, knife and scissors, seldom with the trephine. In addition to trephining for splintered fractures, abscess and depressions the indications laid down by von Bergmann and Wiesmann are recognized in this clinic. In 14 cases of trephining recovery resulted in 9 cases. In those cases which proved fatal after trephining the fatal issue was due rather to the severity of the injury. The operation rather retarded the fatal issue. Most favorable and rapid was the recovery of those fractures where the brain substance remained uncompromised. The less the extent of the bony lesion the more rapid and complete the recovery. Where the motor centers were affected by the traumatism, functional nervous disturbances resulted which may, after a period, have retrogressed. The prognosis is best in the first class of cases, and reserved where the brain substance, but not the motor centers, were affected. In children especially a certain reserve in prognosis should be the rule, for here, though extensive lesions may end in immediate recovery, yet the sta-

tistics show that such patients in later life form a prominent quota of those suffering psychoses. In compound fractures of the skull, therefore, lesions of the absolute cortical centers give a more unfavorable prognosis than lesions of the relative cortical centers. If paralysis has not improved after five or six months after compound fractures of the skull, they may be considered permanent. In all extensive compound fractures the possibility of abscess must be considered. In all injuries of the head, moreover, where the brain substance is injured, psychoses and neuroses *may* develop subsequently. Strict antisepsis should be followed in all these cases. Author records 12 cases of fractures at the base of the skull; 3 proved fatal. The prognosis is favorable in those cases where the brain symptoms are slight and short in duration. The most frequent disturbances of hearing and vision improve if the tympanum alone has been ruptured and the labyrinth in the one case and the optic nerve in the other have not been compromised. Paralyzes are permanent which do not recur to the normal condition or show signs of improvement within a few months. The possibilities of subsequent brain abscess or psychoses must be considered. The frequent douching of the nose and ears with antiseptic solutions is imperative. The antiseptic tamponade of the ear is advocated. In obscure concussions of the brain (Beck) where the lesion of the brain substance is slight capillary apoplexia and absorbable exudate, the prognosis is good as regards the immediate recovery of the patient. It is a guarded prognosis, however, when future psychical complications are in question.—*Deutsch. Zeitsch. f. Chir.*, Bd. xxvi, hft. 3 and 4.

III. **Œsophagotomy for Foreign Bodies.** Dr. GEO. FISCHER (Hannover). The author has collected the details of eighty cases of œsophagotomy found recorded since the year 1738; this includes one case of his own. Of the number 48 were males. Among the bodies swallowed were 25 bones and 22 teeth settings, the rest being coins, needles, fish bones, stones, nuts, foods, blades, etc. In the eighty cases there were 16 deaths, 2 of which occurred immediately after the operation.

Eliminating these two cases we have a mortality of 20%. The

shortest time elapsing between the swallowing of the foreign body and operation was a half hour (Lawson), the longest interval twelve years (Maclean). The operations performed within the first two days of the accident gave a mortality of 15%, and where the operation was delayed to the third or fourth day the mortality reached 30%. The oldest patient operated on with success was 70 years of age. Œsophagotomy, therefore, is not a dangerous operation. Cure and healing of the deep wound resulted in 37 cases within two to six weeks. The rule is a complete closure of the wound; permanent fistula of the œsophagus does not occur. Strictures are not to be found. In only two cases did stricture with communication with the air passages result. Among the causes of death we find in 16 cases, 7 of ulceration or gangrene of the œsophagus, with following abscess of the pleura, pneumonia, bronchitis, gangrene of the lung. In 6 cases the patient died of exhaustion. Once sepsis supervened, in another hemorrhage, and in the last phthisis of the lung. Danger of exhaustion is great in children and old persons. Death is more frequent in cases of postponed operation than from the operation itself.

In cases where the foreign body has been recently swallowed operation should be undertaken the following day, after other methods have failed. If several days have elapsed since the accident, and a single attempt with sounds, etc., has failed, operation should be proceeded to *at once*. If the nature of the foreign body (knife) makes the methods with money catcher, etc., dangerous, operation should be at once performed. In cases where infiltration of the tissues of the neck has set in œsophagotomy is immediately indicated. As to the technique of the operation there is great variance among different operators. The incision in the neck is generally over the space between the trachea and the border of the sterno-mastoid. It is important that the tissues beneath the skin once exposed, the handle of the scalpel or some blunt instrument be used to gain the œsophagus, rather than a knife. Broad blunt hooks, by drawing aside the dangerous structure, give good service. We should follow the plan of first exposing the lateral lobe of the thyroid, then the lateral border of the trachea, and finally the œsophagus. If the thyroid is swollen the operation is complicated

The recurrent nerve is the principal structure we should avoid wounding, aside from the great vessels. If the foreign body can be felt we should open the œsophagus over the same, first fixing the tube by means of tenacula. If this is not the case the sound carried into the œsophagus through the mouth is a necessary guide. The author has found that foreign bodies rarely are situated partly outside the œsophagus. In other cases the operator has failed to find the foreign body after opening the œsophagus. The present surgical procedure demands the closure of a clean incised œsophageal wound. Perforation of the œsophagus, gangrene, abscess or infiltration of the neighboring tissues excludes suturing of the œsophagus, requiring the œsophageal wound to be left open and a drain inserted. Every patient, whether the œsophagus has been closed or not, may be allowed to swallow fluid diet a few hours after operation without the aid of the stomach tube. Œsophagotomy, performed early, is a simple operation, more difficult in small children and patients with short necks, or where infiltration of the surrounding tissues or thyroid exists. The extraction of bodies in any way fixed in the wall of the œsophagus gives rise to great difficulties, and complete and quiet narcosis is necessary for the application of good sutures.—*Deutsche Zeitsche f. Chir.*, Band xxv, hft. 6.

HENRY KOPLIK (New York).

CHEST AND ABDOMEN.

I. Gastrotomy for Digital Exploration of the Œsophagus and Removal of a Foreign Body. By WILLIAM T. BULL, M. D. (New York). This case should be considered in connection with that of Richardson, (*ANNALS OF SURGERY*, vol. v, p. 124), and is the second case of this operation to be recorded. A negro boy, æt. 16, had swallowed a peach stone, which had become impacted in the œsophagus, nine days before operation. He had lost much flesh, and was weak, and complained of thirst and occasional nausea, but vomited only when he attempted to swallow, and had no pain; nothing whatever could be ingested. An œsophageal bougie struck against the foreign body 13 inches from the incisor teeth. Efforts to remove it with coin-catchers or to get beyond it with bougies, having proven un-

successful, the abdominal cavity was opened by an incision 3 inches long, extending from the level of the ninth intercostal cartilage to 2 inches above the umbilicus. No foreign body could be felt along the diaphragm, and the stomach wall was caught up at a point midway between the two curvatures, and 3 inches from the pylorus, and an incision one inch and a quarter long made, through which the finger was passed, after the lips of the abdominal and gastric wounds had been fastened together. The body could not be felt when the abdominal wall was depressed and the finger pushed up as far as possible, until a finger was passed and pressed gently upon it from above. Finding it impossible to grasp it from below, a slender bougie was passed up into the mouth from below carrying a strong silk thread to the lower extremity of which was tied a sponge a half inch in diameter and an inch and a half long; when this was pulled through the body was dislodged; and brought within grasp of the fingers by a larger sponge introduced in the same manner, when it was removed. The gastric mucous membrane was sutured with 8 catgut sutures, and the peritoneal coat with 10 or 12 Lembert sutures of fine carbolized silk. The abdominal incision was closed with a continuous peritoneal suture of catgut and interrupted silk sutures through the other layers, and dressed with bichloride gauze. The operation occupied an hour and a quarter: The wound healed entirely by primary union. *Recovery* was complete in two weeks and a half. Rectal enemata were continued for 5 days, for the first day he received nothing by the mouth, on the second brandy and water and beef tea at frequent intervals, and on the fifth day his diet was unlimited.—*N. Y. Med. Jour.* Oct. 29, 1887.

II. Removal from the Small Intestine of a Spoon Swallowed Three and a half Years Previously. By E. W. WALKER, M. D. (Cincinnati). A sword swallower, upon a wager, swallowed a teaspoon which passed from the stomach into the intestine where it became impacted. Three and a half years later, well marked symptoms of occlusion having appeared, an incision about 2 inches in length was made down to the peritoneum in the median line below the umbilicus. Inflammatory adhesion had attached the gut to the parie-

tal peritoneum, so that, the exact location of the foreign body having been ascertained by exploration with a hypodermic syringe needle, the incision was opened directly without intruding upon the peritoneal cavity. The spoon was then carefully withdrawn, the gut wound closed with 3 silk sutures and the external wound with silver wire. Union appeared to have taken place by first intention throughout, but a fæcal fistula appeared on the seventh day, and persisted for 9 days when it closed. The bowels moved satisfactorily on the eighth day, and *recovery* occurred without stenosis at the point of operation. *Lancet-Clinic*, Dec. 10, 1887.

JAMES E. PILCHER (U. S. Army).

III. Case of Gastrostomy. By CHARLES EDWARD HOAR, M. D. (Maidstone), and JOHN KNOWLES, M. R. C. S. (Maidstone). A man, æt. 60, attended at the West Kent Hospital, with a history of indigestion of many years standing, and difficulty of swallowing for two years. He was spare and with an anxious expression. Nothing abnormal detected in chest, but on auscultating over the cervical vertebræ during deglutition, passage of fluid was heard delayed. No specific or traumatic history, family history good. A medium-sized œsophageal bougie was arrested and gripped near the stomach. For a month he was fed through an œsophageal tube (size No. 7 catheter), which was changed every 4 days. As he was losing weight, and suffering from a cough with frothy expectoration, and much wheezing in both lungs, gastrostomy was decided upon. An incision, 3 inches, was made in the usual position, and the peritoneum divided on a director. The transverse colon which presented was drawn down, and the stomach brought into view, pinched up with the left hand, a small portion withdrawn through the wound and transfixed with two hare-lip pins, one supporting the portion transfixed at the upper angle of the wound, and the other at the lower angle. One or two wire sutures were used to bring the ends of the incision in apposition, and the wound was covered with protective and carbolized wool. The next day the pulse was 100, temperature 101°. Was fed by enemata every 4 hours. Still wore œsophageal tube, although plugged. Swallowed fluids more freely than before

operation but the attempt causes dragging pain at the wound. Adhesions having formed all round, a tenotomy knife was passed into the stomach wall and a small piece of drainage tube inserted, the end being threaded and strapped to the abdominal wall. One hare-lip pin was withdrawn and two days later, the other; at that time the drainage tube, through and around which much oozing, was changed for a pluggæd piece of elastic catheter. On the ninth day and for eight days afterwards food was injected through the opening, a small india rubber tracheotomy tube being substituted for the catheter. While for a time the patient was able to do light work and to feed himself by means of an irrigator and long tube, he continued to fail, and *death* occurred 4 months after the operation. At the autopsy, the lower margin of the stricture was found to be one and a half inches above the cardiac opening, extending upwards for two and a half inches; its upper orifice was a mere chink, and the canal very sinuous. It was a well marked scirrhus growth, and involved the thoracic duct. The artificial stomach opening was midway between the greater and lesser curvatures, 4 inches from the pylorus and three and a half from the cardiac orifice. The integument was firmly and evenly united at the stomach, the adhesions being more than one-fourth an inch thick. Between the opening and the pylorus the wall was hypertrophied. The method of fixing the stomach by hare-lip pins is that employed by Mr. Barrow at the West London Hospital, and previously by Mr. Macnamaray, (See ANNALS OF SURGERY, vol. i, No. 4). The advantages are its easy application and secure fixation.—*Lancet*, Aug. 20, 1887.

P. S. ABRAHAM (London)

IV. **Gastrostomy for Cancer of the Œsophagus.** By J. COLLINS WARREN, M. D. (Boston). A man, æt. 56, had suffered from cancer of the œsophagus which had finally constricted it to the point of impermeability. The abdomen was then opened and the stomach was attached to the wound, according to the method of Howse described in Heath's *Dictionary of Surgery*. The patient was fed entirely by enemata, ingestion being impossible, until the ninth day when a small oblique opening was made into the stomach and a fine gum elastic catheter introduced. Owing to a cough, the wound did

not heal completely, and the opening became enlarged causing considerable leakage. A rubber tube with a flexible collar within and without, was introduced into the opening and used with success until the patient's death from exhaustion consequent upon malassimilation, 4 months after the operation.—*N. Y. Med. Rec.*, Nov. 5, 1885.

V. Laparotomy Complicated by True Hæmorrhagic Diathesis. By CHARLES CARROLL LEE, M.D. (New York). Under a perineorrhaphy previously performed the patient had shown a marked hæmorrhagic tendency, but when, being 26 years of age and suffering greatly from ovaritis and salpingitis, removal of the appendages was undertaken, copious and persistent bleeding accompanied every incision. When the organs were extirpated the pelvis was found to be full of blood, but the main source could not be found; blood oozed from the entire under surface of the broad ligaments and from the base of the pelvis. Prolonged pressure with sponges served to completely check the bleeding, and the wound was closed and dressed. Four hours later signs of collapse appeared and examination showed a recurrence of the hæmorrhage, the wound was reopened and additional catgut ligatures applied to the chief bleeding points and torsion to others. Collapse was averted some hours later by infusion of 10 ounces of 2 $\frac{1}{2}$ % salt solution at 100°F. Convalescence followed with satisfaction.—*N. Y. Med. Rec.*

JAMES E. PILCHER (U. S. Army).

VI. On the Indication and Value of Incising the Intestine in Herniotomy (Hernioenterotomy). By HUGO FUHLROTT (Birkungen). This paper records three cases of inguinal herniæ of large size in which Rosenberger operated for the relief of strangulation. In these cases after exposing the contents of the sac and incising the structures constricting the neck of the hernial sac, it was impossible to accomplish reposition. The cases had been previously treated with taxis; in one case the efforts of the surgeon to replace the gut resulted in a rupture of the intestinal walls; an escape of fluid and gas resulted and after sewing up the intestinal wound the gut was easily replaced.

The patient, æt. 78, made a good recovery. In a second case a patient, æt. 36, with inguinal hernia of left sides, after opening the sac and incising the ring it was impossible to replace the contents of the sac on account of the distention of the intestine and the great intra-abdominal pressure. A transverse *incision* of 1 cm. in the most dependent portion of the gut resulted in a discharge of gas and contents; the gut was then sewed up and easily replaced, resulting in recovery. In another case, æt. 71, of double inguinal hernia, the hernia on the right side became strangulated. The immense size of the hernia and distention of the gut caused the same difficulties as to reposition. Incision was made as above and intestinal contents evacuated then the gut was cleansed and sewed up and easily replaced into the abdominal cavity, with recovery. But these cases were able to perform heavy labor after operation which must in every way be considered successful. In these cases, therefore, of large scrotal hernia or eventration, though the patients are mostly of advanced age, the prognosis of the operation is not bad. Petit's procedure of leaving the intestines exposed and covering them with moistened cloths is not aseptic and involves changes. The gut has often been incised after herniotomy, either accidentally or with express object and the sac contents subsequently replaced into the abdominal cavity. In most of these cases the intestinal wound was not closed, the patients for the most part recovered (Dinkelacker, v. Ludwig, Kruger, Linhardt). In some cases the intestine was simply punctured with a needle or with trocar (Fischer). If the intestine is gangrenous when the sac is opened the best procedure is to fix the gut to the abdominal wall and form an artificial anus (Rosenberger). It is only when the intestine is still in good condition that the above incision is indicated. The size of the incision in the gut must vary with the necessities of each case. With strict antisepsis the incision and opening of the healthy intestines appears to be attended with no danger. Though many surgeons have in early days replaced the gut without closing the incision, it is the safer procedure to close the incision in the intestine with silk suture.—*Deutsch. Zeitschr. f. Chir.*, Bd. xxv, hft. 4 and 5.

HENRY KOPLIK (New York).

REVIEWS OF BOOKS.

THE SURGICAL DISORDERS OF THE URINARY ORGANS. By REGINALD HARRISON, F.R.C.S. Third edition. J. & A. Churchill, London, 1887.

This new edition of Harrison's well-known work is considerably larger than its predecessor and contains much fresh and valuable matter besides many new plates. We see, amongst other additions, chapters on Toxic Urine and Urinary Fever, Treatment of Stricture by a Combination of External and Internal Urethrotomy, Urinary Tuberculosis, Prostatectomy, Supra-pubic Cystotomy, etc.

The author seems to have met with marked success, *i. e.*, as far as freedom from urinary fever is concerned, in the combined operation of internal and external urethrotomy, for he says "it has been uniformly noticed that after the double operation we have never had a rigor nor the development of the special form of urinary fever which frequently follows internal urethrotomy, and is occasionally fatal without forecast or explanation." The statistics of internal urethrotomy even under the most advantageous conditions give rigors or shiverings as occurring in about 50 per cent. of cases, but although this seems avoided by the combined method one incurs other risks; as, for example, fistula and its possible complications. We are glad to see that it is recommended to carry the dilatation of a stricture up to 15 or 16 (Eng.), and no doubt in most cases this may be done with advantage.

Surgeons in this country often err in resting content with the passage of much smaller instruments, the consequence of which is that not only is a cure impossible, but it is often difficult to maintain a moderately free passage.

Speaking of supra-pubic cystotomy, Mr. Harrison says: "In male children after supra-pubic cystotomy I should advise the accurate adjustment of the bladder wound with catgut sutures, and the separate closure of the parietal wound with the use of a drainage-tube and an iodoform dressing. In young children it is, I believe, better to dispense with the catheter and to depend upon the accurate adjustment of the bladder wound by sutures. In adults I would leave the wound in the

bladder as well as in the parietes open, though the latter may be reduced in size by the insertion of one or two sutures. This is in accordance with the views held by Sir William MacCormac. The author is not altogether in favor of this operation for the removal of stone which cannot be dealt with by crushing. He would limit it to those cases in which the removal of stone by the perineal route could not be safely undertaken; but he says his experience of the high operation is very limited.

Lithotrity in male children does not find a strong advocate in Mr. Harrison, who would restrict its field to single stones not exceeding three-eighths of an inch in any diameter where one or two grasps with the lithotrite is all that would be required. The debris should be allowed to escape spontaneously. Although this is the view of the author, he recognizes the splendid results of litholapaxy in male children obtained by Surgeon-Major Keegan in India.

The book is brought to a conclusion by a couple of most instructive chapters on bladder tumors and their treatment. Here, again, the perineal route is preferred to the supra-pubic, both for examination purposes and the removal of growths.

This edition is thoroughly abreast of the times, which is saying a good deal looking to the immense strides urinary surgery has made since the appearance of the former edition seven years ago.

That this volume will enjoy even a greater popularity amongst both students and surgeons than its predecessors, there is little doubt, and we can recommend it in all confidence as containing more information on urinary surgery, as a whole, than any other book in the English tongue of which we are cognizant.

STRICTURE OF THE URETHRA, ITS DIAGNOSIS AND TREATMENT
FACILITATED BY THE USE OF NEW AND SIMPLE INSTRUMENTS.
G. E. DISTIN-MADDICK, F.R.C.S., Edin.; London: Baillière, Tindall & Cox. 1887.

The chief object of this little book appears to be to protest against the use of force in the treatment of stricture by dilatation. It enjoins not only the greatest gentleness in instrumentation of this canal, but says that catheterism and bougieism should not be hurriedly resorted to, the preparation of the patient prior to this being of much importance.

After noticing spasmodic stricture at some length and pointing out the harm which often results from instrumentation in this condition.

the author passes to the consideration of permanent stricture and recommends (as indeed do all writers on the subject), that in simple cases gradual interrupted dilatation should first be tried, and should this not succeed, continuous dilatation should be substituted. As to what he does in non-dilatable cases unaccompanied by retention, one is left in the dark.

We fail to find any mention of internal or external urethrotomy or indeed of rapid dilatation or divulsion. However, it is but just to say that the author disavows all intention of going into the question of complicated stricture, for he says: "It would be waste of time and labor, for I feel sure that those for whom my book is intended (presumably general practitioners) would have neither time, patience, inclination nor instruments to undertake the cure of such cases."

As to the new and simple instruments; one is a tube to be used where there is any difficulty in entering the stricture. It protects the urethral walls and stretches out the face of the contraction in the same way as does Benique's tube from which it however differs in having several enclosed tubes, through each of which a filiform bougie may be passed. Another new instrument is a form of catheter devised to take the place of the bougie olivaire to which the author seems to object.

In drawing attention again to the importance of gentleness in urethral instrumentation, if for nothing else, The author will deserve thanks not only from the class for which it is written, but also from the patients themselves, and we cordially endorse the following remarks: "Any surgeon who shows the slightest disposition to resort to force in order to pass an instrument utterly into the bladder must be either grossly ignorant or reckless.

F. SWINFORD EDWARDS.

THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE KIDNEY AMENABLE TO DIRECT INTERFERENCE. By W. BRUCE CLARK, M.A., M.B., Oxon., F.R.C.S., Assistant Surgeon to and Senior Demonstrator of Anatomy and Operative Surgery at St. Bartholomew's Hospital, etc., etc. (Illustrated). London: H. K. Lewis, 136 Gower Street, W. C., 1886. 8vo., pp. 176.

The substance of this work constituted the essay to which the coveted and well-known "Jacksonian prize" of the Royal College of Surgeons of England was awarded in 1886. This essay has been revised, enlarged and brought up to date.

Mr. Bruce Clarke has a plain, straightforward style and a sense of

order and method which make the plan and arrangement of his book visible almost as soon as it is opened. With these characteristics it is natural that the illustrations are mostly diagrams or semi-diagrams. They are none the less useful.

The practitioner will therefore find this book a convenient one from which to get an insight into the present state of renal surgery without having to puzzle or weary his brains too much with masses of facts, most of which would never be likely to have much significance to anyone but a specialist.

The normal anatomy of the kidney is first dealt with, then its deformities, next, in the following order: Injuries, new growths, parasites, hydronephrosis, calculus, tubercular pyelitis and abscess from other causes, perinephritis, hæmaturia, pyuria, operations and methods by which one ureter can be temporarily occluded. In conclusion, there are a bibliography and an index. The work naturally contains a large number of references, which are for the most part useful and judicious. Occasionally, however, they are not perfectly accurate; for instance, our own journal is not correctly described at page 19, and the same annotations wherein this misdescription occurs, contains an example of a kind of "rough and ready" mode of expression into which Mr. Bruce Clarke too often allows himself to fall, a mode of expression not in keeping with the character of a systematic surgical monograph or treatise. Another fault similar in origin, though not the same in nature, occurs in the first foot-note on page 79.

But these blemishes do not seriously affect the value of the book, and may be got rid of with a little care in a future edition.

The book is well printed, neatly bound and of convenient size.

C. B. KEETLEY.

AUTOBIOGRAPHY OF SAMUEL D. GROSS, M.D., D.C.L. Oxon., LL. D., Cantab., Edin., Jeff. Coll., Univ. Pa., Emeritus Professor of Surgery in the Jefferson Medical College of Philadelphia. With sketches of his Contemporaries. Edited by his sons, SAMUEL W. GROSS, M.D., and A. HALLER GROSS. In two volumes, 8vo., cloth, Roxburgh binding. Philadelphia, George Barrie, Publisher, 1887.

Among the surgeons of America at the time of his retirement from the active duties of a lecturer on surgery, Dr. Gross stood *facile princeps*. For many years he had been a leader in every movement for the advancement of the profession, which he so highly honored. His commanding figure, noble features, magnificent presence and genial manners, together with abundant resources of wit and learning, rendered

him perforce a conspicuous personage in any gathering, professional or social, in which he was found. In addition to the attractive attributes with which nature had endowed him, not less of his success was due to his extraordinary capacity for hard work.

This was exemplified in his course immediately after having acquired his doctorate in medicine. In the absence of professional observation of his own, he devoted himself to making available the labors of others, translating Bayle and Hollard's *General Anatomy*, Hatin's *Manual of Obstetrics*, Hildebrand's *Typhoid Fever* and Tavernier's *Operative Surgery*. He followed these with an original work upon the *Anatomy, Physiology and Diseases of the Bones and Joints*, completing them all within eighteen months after he had received his degree. The literary labors, thus early begun, were continued throughout his life, two important papers prepared during his last days being published posthumously. His work on *Pathological Anatomy*, the first systematic treatise upon that subject in the English language, was published nine years after receiving his degree, while his work on the *Diseases of the Urinary Bladder*, published twelve years later, holds high rank in the literature of the subject. His works on *Foreign Bodies in the Air Passages*, *Wounds of the Intestines*, *Military Surgery*, *Lives of Eminent Physicians and Surgeons of the Nineteenth Century*, and *John Hunter and His Pupils*, followed hard upon his earlier efforts. In addition to these, he wrote extensively for the medical periodical press, and from time to time presided editorially over several medical journals. But the work of his life, his best monument after death, was his *System of Surgery*, first issued in 1859, passing through six American editions, the last of which appeared in 1882, and being translated into several other tongues. The two portly volumes, in which it appears, form his surgical autobiography, as the work now under consideration forms his personal autobiography, and the various editions present a faithful mirror of his surgical practice during half a century of teaching.

It is interesting to note that his direct income from his published works during the forty two years following his graduation in medicine, was about eighteen thousand dollars, the greatest portion of which was derived from the *System of Surgery*, while his receipts from his various professorships amounted to one hundred and ten thousand dollars. The actual profit derived from both sources, however, was many times these amounts, because of the fees gained by the practice which they produced.

Notwithstanding the high position which he attained in surgery, Dr. Gross remarked: "I have always thought myself a better physician

than surgeon," basing his belief on the extensive experience which he had gained during many years of family and consultation practice. He had a natural repugnance to the sight of blood, and, when a student, was once obliged to leave a room in which phlebotomy was being done, to avoid fainting. Throughout his life, he felt uncomfortable while witnessing an operation, although he could forget his feelings when he himself wielded the scalpel.

Rarely has a man received the contemporary recognition accorded to this one. The profession of his own country were far from failing in any respect to show the veneration with which he was regarded by them, while the highest scholastic honors of other countries were showered upon him. His learning was recognized by the three great universities of Great Britain, and he was decorated in the precincts halloed by the memories of Linacre and Radcliffe, Caius and Monro. A large portion of his memoirs is devoted to a rehearsal of the interesting events of his tours abroad. He was greeted with most cordial respect by Virchow, Langenbeck, Billroth and Rokitansky, his observations upon whom are of the greatest interest. In England, his relations with Syme and Simpson of Edinburgh, Ackland of Oxford, and Humphry of Cambridge, Paget, Gull, Erichsen, Burrowes, and many others equally distinguished, were agreeable, and their recital adds not a little to the interest of the work. He particularly admired the author of *Rab* and his Friends, whose acquaintance he had formed in Edinburgh, and whom he eulogizes more than once.

His relations with Marion Sims were close and intimate, and his sketch of the life and character of Sims is full and appreciative. He refers to the large income which Sims received when at the zenith of his fame, and quotes from one of his letters an itemized account of his receipts for a single month, amounting to more than twenty-two thousand dollars. Many other American physicians are the subjects of kindly sketches, among whom may be found the two Flints, Mott, McClellan, Physick, Bache, Mussey, Dunglison, Horner, Hays and Pancoast.

Dr. Gross was to an eminent extent an organizer. To his exertions were due the formation of the American Surgical Association, which is accomplishing so much good work, and the Philadelphia Academy of Surgery. He was the first to publicly suggest the journalizing of the transactions of the American Medical Association, of which he was one of the founders and at one time the president, while a number of other useful institutions were brought into existence by him.

In his domestic relations, Dr. Gross would seem to have been charming. The tenderness with which he refers to "my dear wife," and the

readiness with which he accords to her the credit for great aid in his literary and social plans, together with his touching attitude regarding her last hours and her many virtues cannot but add to the dignity of the great surgeon.

While the editorial work upon the memoir has been excellent, and the mechanical work almost perfect, the reader can not but wish that one or two points might have been changed. The abrupt termination of the narrative, at the point where the author laid his pen down for the last time, grates upon the mind. If that portion of the introduction, relating to the Master's last hours, had been more detailed, rendered a little more definite and placed at the end of his story, it would have been a source of satisfaction to many. The only other blemish to be noted is the incompleteness of the index, which detracts decidedly from the value of the book as a working history.

Nevertheless, it is rare that a single book has contained so much of value pertaining to the history of medicine and surgery. Rarely has so perfect a view been presented of the real life of a great man as this one. And it is not only the reflection of his joys and triumphs, his griefs and sorrows, but it is as well a grand picture in which are limned lifelike portraits of most of his distinguished contemporaries.

JAMES E. PILCHER.

LEHRBUCH DER ALLGEMEINEN CHIRURGIE. Von Dr. med. HERMANN TILLMANNS. Docent der Chirurgie an der Universität Leipzig, Veit & Co., 1888. New York, G. E. Stechert.

TEXT BOOK OF GENERAL SURGERY.

The above is the first volume of a larger work, entitled 'Lehrbuch der Allgemeinen und Speciellen Chirurgie' in two volumes; but each half of the work is intended to form a complete work in itself. The second half is promised within a year. The contents of the book in its present form embraces general operative technique, general surgical bandaging and general surgical pathology and therapeutics. The study, practice and history of surgery and the development of modern surgery are made the subjects of an introductory chapter.

The third part, the most important one, treating of general pathology and therapy, contains five subdivisions as follows:

(1) General remarks on injuries and inflammation; (2) Injuries and surgical diseases of soft parts; (3) Injuries and surgical diseases of the bones; (4) Injuries and surgical diseases of the joints; (5) Tumors.

The book contains over 500 large octavo pages, is handsomely printed and illustrated by 337 wood cuts.

Attention is given throughout the book to the antiseptic methods, and the more recent advances in the pathology of surgical conditions have received consideration.

Cocaine solutions for local anæsthesia have not received the prominence frequently given them, the author preferring to use the ether-spray for minor operations. The chapter on general anæsthesia has been written with great care, and more attention is given to ether-narcosis than is generally to be found in German works, although the author appears to have had little personal experience with this anæsthetic. He asserts that it requires more care to keep the patient in a state of insensibility to pain by the use of ether than with chloroform.

The preparation of the antiseptic material may be found described under various headings throughout the book, but is generally somewhat summarily disposed of. Especially the sponges might be considered deserving of more attention. These, the author believes, may be appropriately treated by boiling them for 15 minutes in a one-in-thousand sublimate solution, and keeping them in a similar solution. He does not mention the use of soap in this procedure, so strenuously insisted upon by some antisepticians. He gives no method for bleaching sublimated sponges, although he does for carbolized ones.

In the chapter on inflammation, the terms inflammation and suppuration are frequently used in apposition in a manner scarcely conducive to a clear understanding of these difficult subjects. Thus, p. 190, he says: "We shall see that all inflammation affecting wounds, especially all suppuration, is caused by the presence of schizomycetes;" and p. 233, "All inflammation and suppuration of wounds depend upon the presence of schizomycetes." Had he omitted the term inflammation the statement could be more generally accepted.

In speaking of septic conditions he, in several places (pp. 15, 118, 256), defines septic processes as putrid ones, and uses the terms septic and putrid indiscriminately, which even the Greek etymology can hardly justify, considering the wide difference at present recognized between the two poisons. In defining septicæmia, he retains Gussenbauer's definition, that it is a disease of the system caused by absorption of excitants or products of *putrefaction*; and he commences the chapter on pyæmia by saying that heretofore this disease was considered to be caused by the absorption of component parts of pus into the blood.

These explanations and definitions, which are given much prominence to catch the eye, are not in keeping with the subsequent teach-

ings in the same chapters, especially when reference is made to the later acquired knowledge, and it is difficult to understand why the author should prefer to start with older views in pathology and afterward explain them away, unless he desired to give the historical aspect of surgical pathology more prominence than the consideration of giving the student a clear view of its present state. Such points of historic interest in the development of surgical pathology could be far better discussed in the smaller type of the notes, and would not tend to perplex and mislead the student so greatly.

This arrangement of the subjects tends to give the book an extremely pedantic aspect, and makes it appear more in the light of a compilation, an effect which is still enhanced by the diligence of research and knowledge of German surgical literature displayed. The author's style, too, often savors of the pedantic. In speaking of the necessity for the surgeon to cleanse his hands before operation, he advises him especially to provide for clean finger-nails, "which," he adds, "in any case form a desideratum for every educated man."

In the chapter on the healing of wounds and the closure of arteries after antiseptic ligature (which he still attributes to the formation of a blood-clot, instead of to arteritis) similar conditions to those above mentioned may be noted. The succeeding chapters, in which the more recent influences of modern surgery have not been of such radical importance, are written in a more equal strain.

HANDBUCH DER ALLGEMEINEN CHIRURGISCHEN PATHOLOGIE UND THERAPIE in 40 Vorlesungen für Ärzte und Studierende, von DR. ALBERT LANDERER. Docent für Chirurgie an der Universität Leipzig. I. Hälfte. Wien und Leipzig, Urban & Schwarzenberg, 1887.

HANDBOOK OF GENERAL SURGICAL PATHOLOGY AND THERAPY.

Among the many books on general surgery that owe their origin to the great advances which have of later years been made in surgical pathology and surgical practice, and are intended to present in a symmetrical manner the various note-worthy monographs which have more recently been made public, this book at once attracts attention and fascinates the reviewer. Not that every detail of scientific research has been laboriously gathered and arranged according to its merit in one large compilation, but the chief merit of the work lies in its originality. Everywhere, on every page, the original manner of the author strikes the reader, and although one here meets the same views that one may find in the pages

of the latest editions of works on general pathology, yet the matter has evidently been so well digested and assimilated, that the author is enabled to present it from a point of view entirely original. In this fact lies the fascination of the book.

But it must not be imagined, however, that the work is devoid of all truly original work. Readers of the *ANNALS OF SURGERY* are acquainted with the author's name through his writings on inflammation, transfusion, etc., and extensive laboratory work (done for the most part in Cohnheim's laboratory) is attested by the numerous original illustrations representing microscopical studies of pathological conditions.

The present volume represents but half of the entire work, which is to contain forty lectures, and is to be completed by January, 1888. It will contain over 600 pages octavo. The present lectures treat almost exclusively of surgical pathology, the treatment of wounds and anæsthesia.

The chapters on inflammation and the healing of wounds are especially deserving of praise. The one on tumors, although unfinished in the present volume, promises much.

The style of the author is somewhat difficult, owing partly to the free use of rhetorical figures and tropes to illustrate the sense, and partly to the fact that a great amount of matter has been presented in a comparatively small space. Partly for this reason, and because of its high scientific value, a good translation into the English language would be very acceptable.

LEITFADEN ZUR ANTISEPTISCHEN WUNDBEHANDLUNG mit Rücksicht auf ihren gegenwärtigen Standpunkt. Von Geheimrath von NUSSBAUM, München. Fünfte, gänzlich umgearbeitete Auflage. Stuttgart, Ferdinand Enke. 1887. New York, G. E. Stechert.

GUIDE TO THE ANTISEPTIC TREATMENT OF WOUNDS WITH REFERENCE TO ITS PRESENT ASPECT.

Since the fourth edition of the above well-known text-book on antiseptic surgery was printed, the advances in this subject have been so manifold that it proved necessary to re-write the book completely.

We here find 80 antiseptics catalogued and described; minute instruction given in the different technical methods of dressing wounds, and the pathology and treatment of the diseases and conditions affecting wounds set forth, all with due consideration of the more recently

published experimental and other researches, which have played so important a part in periodical literature during the last years.

A special feature of the fifth edition is the interspersing of practical remarks upon the more important surgical diseases throughout, done, as the author informs us in the preface, by request. In addition, a number of operations performed after the antiseptic method and 20 paradigmata of the after treatment after various operations are given in detail, and form a series of valuable illustrations of the antiseptic technique.

The book is deserving of the highest praise in every particular.

VORLESUNGEN UEBER KRIEGSCHIRURGIE. Von Prof. DR. RITTER VON MOSETIG-MOORHOF. General-chefarzt des Hohen Deutschen Ritter-Ordens, Wien und Leipzig, Urban und Schwarzenberg, 1887. New York, G. E. Stechert.

LECTURES ON MILITARY SURGERY.

Judging from the author's remarks in the preface and in the introduction of the first lecture, this book is published in anticipation of a war proceeding out of the present strained political situation in Europe.

For this object the book is eminently well qualified both on account of the author's great personal experience in military surgery during the recent wars, and also for the reason of its being thoroughly up to the times in all the measures endorsed. Military surgeons could not do better than make themselves thoroughly familiar with each of the twenty-one lectures contained in it.

But apart from the consideration in which it was written, the book is a most valuable one for every surgeon to possess. It is beautifully written, so that it is a real pleasure to read it. Nor is the style of the author difficult to understand, even for one less thoroughly versed in the German language.

It further contains numerous points in general and minor surgery that are useful and important to every practitioner. The smaller details in the handling and dressing of wounds have been given all the attention they deserve. We may here, too, find the technique of iodoform dressings properly described—which is as rare as it is important—and yet without undue enthusiasm, as might be expected from the great champion of iodoform surgery.

The book, which is inscribed to His Imperial Highness, the Archduke William, is well appointed in every respect. There are no illustrations.

DIAGNOSTIK DER CHIRURGISCHEN KRANKHEITEN. Von Dr. E. ALBERT.
Vierte gänglich umgearbeitete anlage. Vienna, 1887, Alfred Hölder,
New York, G. E. Stechert.

THE ART OF DIAGNOSIS OF SURGICAL DISEASES.

This book is well known in its former editions. In thirty-seven chapters the author contrasts the principal forms of surgical conditions and injuries with special reference to differential diagnosis. Occasionally a note as to prognosis or as to an indication for treatment is interspersed.

As far as the subject matter is concerned we may find the same in the textbooks of surgery. But here the subjects of similar aspect are grouped together, and each difficulty surrounding the diagnosis is separately dwelt upon,

The work is written in a masterly manner, and in an attractive, lively style, which brings home to the reader the difficult points of the subject.

W. W. VAN ARSDALE.

MEDICAL CLASSICS. E. B. Treat, Publisher, New York, 1887.

A series of twelve small octavo volumes, written by different authors, on a variety of medical topics. Each volume contains an average of between three and four hundred octavo pages. The price of the set is eighteen dollars; any one of the series may be bought separately.

A PRACTICAL TREATISE ON THE DISEASES OF THE HAIR AND SCALP. By GEORGE THOMAS JACKSON, M.D., Instructor in Dermatology in the New York Polyclinic, etc, etc.; pp. 320. Illustrated.

In the preface the author says he needed a book of this character five years ago, and finding none began the studies which have resulted in this volume. Part I gives the anatomy, physiology and hygiene of the hair. Part II is devoted to the essential diseases of the hair. Part III, parasitic diseases of the hair. Part IV treats of diseases of the hair secondary to diseases of the skin.

Dr. Jackson has given us a most interesting and instructive book; it is true, most of the medical facts contained in it are to be found scattered throughout the different departments of medicine, and the physician has perhaps known them all at various times, but the value of the work consists in the labor, skill and judgment the author has

exercised in collecting all these facts and presenting them in such a way as to give us a complete and exhaustive work on the diseases and proper care of the hair and scalp.

The bibliography is very extensive, and there are a number of drawings and photographs gotten up in good style by the publisher.

INSANITY, ITS CLASSIFICATION, DIAGNOSIS AND TREATMENT; A Manual for Students and Practitioners of Medicine. By E. C. SPITZKA, M.D., Professor of Medical Jurisprudence and of the Anatomy and Physiology of the Nervous System, at the New York Post-Graduate School of Medicine, etc. Pp. 424. Illustrated.

The publisher announces that this second volume of the series has been recommended as a text-book by a number of leading medical schools in America. This alone might be considered as proof of its excellence. The author's division of delusions into "systematized" and "non-systematized" is a step in the right direction. The beginner in the diagnosis of insanity will be struck by the chaos he finds in the rules for determining whether a person is insane or not, and especially the form of the disease in a given case; every effort, therefore, to introduce order and system into the manner of observing and recording the phenomena presented by the insane deserves our praise.

It is doubtful if the average mortal could ever get a mental grasp of Dr. Spitzka's definition of *insanity*, but if, as some alienists think, the only use of a definition is to puzzle the lawyers, his is a most excellent one. The account of the morbid anatomy of the brain in insanity is fully up to our present knowledge of the subject. The author is right when he deplores the absolute banishment of all mechanical restraint from asylums for the insane. We speak advisedly when we say that, if all the facts could be obtained, it would be found that the amount of mental and physical suffering and curtailment of life, which the abuse of mechanical restraint has wrought, would not be greater than that which is caused by the indiscriminate use of the much vaunted *chemical* restraint, and that we have gained nothing by substituting the stomach pump and hypodermic syringe for the canvas jacket and Utica crib. On the whole, we can recommend this book to anyone wishing a knowledge of insanity as understood at this day.

A COMPLETE HANDBOOK OF TREATMENT, ARRANGED AS AN ALPHABETICAL INDEX OF DISEASES. By WILLIAM AITKEN, M.D., (Edin.) F.R.S., Professor of Pathology in the Army Medical School, Exam-

iner in Medicine in the Military Medical Services of the Queen, etc. Edited with notes and additions by A. D. ROCKWELL, A.M., M.D., late Electro-Therapeutist to the New York State Woman's Hospital, etc.; pp. 444. 1887.

This third volume of the series is an index of diseases, arranged in alphabetical order beginning with "Acne" and ending with "Yellow Fever." After the name of each disease follows a short definition which also includes the cause, morbid anatomy and symptoms, all expressed in the fewest possible words; then comes the *treatment* which is the feature of the book. The latest treatment recommended by the best authorities is given in a concise and comprehensive style.

Dr. A. D. Rockwell, the well-known authority on the medical uses of electricity, is the editor of the book, and we are thus assured that in following the directions here given for the employment of electricity in the treatment of disease, we get all the benefit from this source which is at present known to science. As a ready and reliable reference book for treating medical diseases it far excels any which has come under our notice.

JOHN H. GIRDNER.

THE MODERN OPERATIVE TREATMENT OF TUBERCULAR JOINT AFFECTIONS.

By ARPAD G. GERSTER, M.D.,

OF NEW YORK.

PROFESSOR OF SURGERY AT THE NEW YORK POLYCLINIC; SURGEON TO THE
MOUNT SINAI AND THE GERMAN HOSPITALS.

WE owe to Koch the knowledge that tuberculosis, whether in the lungs, the meninges or in the joints, is produced by the colonization and growth of a specific bacillus. The slow progress of the disease, its well known tendency to coagulation—necrosis, caseation and emulsification, which lead to more or less extensive destruction of tissue and the formation of cold abscesses, were well noted by surgeons even before the true cause of these phenomena was appreciated. It is not within the scope of this paper to discuss the measures of prevention or cure of joint tuberculosis, known under the comprehensive name of orthopædics, although the separation of the orthopædic, and more strictly speaking, surgical treatment of this affection, is unnatural and illogical. They do not antagonize, but rather supplement each other.

Yet I wish to call attention to two aids of anti-tubercular therapy, preventive and curative, that do not receive the attention they amply deserve.

The first of these is the ice-bag. Aside from fixation and rest, I do not know any therapeutical measure that affords more comfort to the patient than a methodical and properly graduated process of refrigeration of the hot and tender joint afflicted with tuberculosis. But, aside from this, numerous instances in my experience have demonstrated the fact that the progress of the disease has been frequently retarded, or even completely arrested by the prolonged use of dry refrigeration combined with rest in such joints as the knee and elbow, for instance, which are amenable to an energetic application of

cold. The hip joint, buried under a great mass of highly vascularized muscular tissue, does not offer as good conditions for thorough cooling as the knee and elbow.

The beneficial effects of the prolonged application of cold to tuberculous joints, especially in cases belonging to the group of purely synovial tuberculosis, have been correctly appreciated by most German surgeons, such; for instance, as Volkmann, Esmarch and Koenig; but credit for rational explanation of this fact is due to the efforts of Koch, who has demonstrated by experiment the extraordinary sensitiveness of the bacilli of tuberculosis to slight variations of the temperature of the soil in which they grow. A depression of the temperature of the culture soil by two centigrades below the normal human standard was invariably sufficient to arrest the propagation of the bacillus.

It is to be added that such a lowering of the temperature of the medium within which tubercle-bacilli thrive, does not kill the spores or seed of the fungus; it only arrests further propagation, that is, brings about an arrest of growth. Thus, during the pause of growth of the noxious elements, time is afforded to strengthen the general power of resistance of the organism by proper diet and medication, and the healthy tissues have a chance to throw up around the focus of disease a protective, encapsulating wall of granulation-, or ultimately of dense connective tissue.

The other form, of curative and preventive therapy, deserving assiduous study and cultivation, *consists in the early ferretting out and surgical evacuation of tuberculous cheesy foci* located in the epiphyses of the bones entering into the formation of this or that joint. It is well known that almost all cases of infantile joint-tuberculosis are produced by the extension of the specific process to the joint by perforation from adjacent osseal foci.

Space does not permit me to quote pertinent histories from my own, and from the experience of other surgeons; but it stands to reason, that if such a focus is diagnosticated and evacuated *before* its extension to the joint, a truly conservative step will have been taken by the surgeon, who thus by one stroke prevents the involvement of the joint. Many of these

foci are located superficially, and can be easily diagnosed, exposed and emptied of their contents of cheesy matter and sequestra. Our means for the exploration of deep-seated foci are less satisfactory; but surgical ingenuity will not fail to produce a safe and satisfactory way of ascertaining the presence and exact location of these deep-seated foci, as soon as the importance of this plan of treatment and its high prophylactic value will be fully appreciated. I intend to bring my endeavors in this direction to your notice at the proper time.

The measures here advocated, that is the early exploration of diseased epiphyses, and the evacuation of tuberculous foci threatening perforation into an adjacent joint, are, if properly managed, free from great dangers, both as regards hemorrhage and suppuration, and are excellently borne by the patients.

Before entering upon the consideration of the operative therapy of joint-tuberculosis it is necessary to draw the limits, at which the orthopædist's efforts cease to be useful, and beyond which operative aid is required.

For purely practical reasons all cases of manifest joint affection must be divided in two classes: those of adults, and those of children.

The majority of tuberculous joint-affections in *adults* occur among the poor, the illy housed and insufficiently nourished, many of whom are found at the same time to be afflicted with lung trouble. A strictly orthopædic treatment of these cases, especially of those in which the lower extremity is involved is mostly impracticable or even impossible, as the patients lack the means for defraying the cost of their maintenance and of apparatus. And even if apparatus is procured, the strain of the weight of the adult body upon the apparatus is so great that much more repairing and tinkering is needed than would be the case in similar affections of children.

There are yet no institutions for the reception and orthopædic treatment of these cases, and a poor laborer afflicted with a chronic tubercular complaint of the knee-joint, for instance, will have to pass through a long experience of neglect and suffering until his own common sense will urge him to beg for an operation. If admitted to a hospital, the hackneyed series of time-honored but useless remedies will be invariably

inflicted upon him. Zealous members of the house-staff will not heed his protests, and will unswervingly put the limb into a plaster case, will poultice, will blister and finally will try the actual cautery, all to no purpose, as others have done before them. Finally, the patient will be discharged "improved," to wend his weary way to another hospital. Ultimately, a cold abscess will form. It will perforate outward or will be incised. Some neglect of the antiseptic precautions at or after the time of the opening of the abscess will lead to pyogenic infection of the soil already ravaged by the inroads of tuberculosis, and acute destructive suppuration will be superadded to the slow process of decay inaugurated by the bacillus of tuberculosis. New abscesses and sinuses developing, the patient's general condition will become so lowered that amputation, as a life-saving measure, will become imperative.

This is the typical and sad course of these cases, as all can attest, and in view of these facts the question must be raised: Is there no way of shortening the patient's endless misery? The answer is and must be—yes, there is, *by early exsection.*

By exsecting the tuberculous hip, knee or ankle joint of an adult, we cut short a long and painful illness, and often reclaim the patient from humiliation and beggary to usefulness and life's enjoyment. Besides, it is an undeniable fact that the results of operations performed on the adult before the establishment of sinuses are infinitely better and that cures are accomplished much more quickly than in the presence of an extensive destruction of the soft and bony tissues.

The indications for the operative treatment of chronic joint affections of the upper extremities of adults are less stringent; but even here great weight must be accorded to external circumstances, such as inability to earn a livelihood, steady deterioration of health and "morale," in determining the surgeon to operate early. The noteworthy decline of the rate of mortality after joint exsections, brought about by antiseptics, clearly justifies this course.

To sum up we may say that *in tuberculous affections of the joints of adults in poor circumstances, especially those of the lower extremity, early operations are indicated and justified; total or*

typical exsections deserving the preference, as a rapid and lasting cure is most desirable.

In children matters stand somewhat differently. First of all must be mentioned the fact that the hygienic and general treatment aimed at the improvement of the health of the little patients commonly receives all the desirable care and attention on the part of anxious and loving parents, whose devotion to the welfare of their children is the surgeon's most welcome ally in combating disease. Furthermore, the orthopædic treatment proper is much easier than in adults on account of the lesser size and weight of the infantile body. Hence, in all cases general and orthopædic treatment should be first instituted and carried on as long as possible. Many cases will prosper under the eye and hand of a vigilant and careful practitioner, terminating in ultimate recovery.

In a large proportion of cases no abscess will develop. Should this occur, the abscess should not be incised, but rather tapped, evacuated and injected with a solution of iodoform in ether (5 : 100). If the abscess refill, this may be repeated several times till involution be manifest.

In tapping, but especially while injecting cold abscesses, the utmost care should be paid to antiseptics, as disregard of these cautelæ may lead to infection and acute septic suppuration of the cavity. The strictest attention must be paid to the disinfection of the trocar canula, which should be effected by prolonged boiling or better still by passing the instrument through the alcohol flame.

Should all these measures prove to be of no avail, either on account of the virulence of the disease or because of the disregard of the directions of the physician, or the negligence or incapacity of the parents, and the development and perforation of abscesses or inexhaustible and profuse suppuration lead to marked loss of power and general deterioration, operative treatment will be in order.

The modern principles governing the exsection of tuberculous joints differ in many respects from those that obtained before the advent of antiseptic surgery.

The first and most important rule is embodied in the necessity of conscientiously removing all tissues, soft and osseous, that are

found to be manifestly diseased, or even morbidly altered. We have to deal with tuberculous tissues as though they were cancerous.

In the joint affections of adults, generally belonging to the synovial type, where the cartilaginous covering of the epiphyses will usually be found destroyed and the articular surfaces carious, the synovial capsule intumescent and containing cheesy deposits, total or typical exsections will be required to insure a complete removal of all diseased tissues.

In children, where the articular trouble is mainly local, that is, circumscribed or limited to certain portions of the joint, only those parts should be removed that are actually diseased. Observance of this rule is very desirable on account of the arrest of growth invariably following whenever the epiphyseal cartilage is sacrificed in total exsections of certain joints as, for instance, the knee. Partial or atypical exsections of infantile joints yield excellent results under an aseptic management, and are universally recommended and practiced. The capsule, however, should be always completely exsected.

The scrupulous observance of the rules of aseptic and antiseptic practice is now generally conceded to be a prime condition of the safe performance of joint exsection. Pyogenic, that is, acute suppurative infection will be thus excluded with great certainty from the wound, and the rapidity of cure and excellence of the final result will be proportionate to the success of the surgeon to maintain asepticism.

Wölfler has demonstrated, that while Esmarch's bandage is *in situ*, no absorption whatever can take place centerward from the wound through the injured veins and lymphatics. Hence, it is perfectly safe to continuously irrigate the exsection wound even with strong solutions of corrosive sublimate, as long as the constricting band remains attached. In the hip and shoulder joints, where Esmarch's bandage cannot be applied, irrigation by a continuous stream of Thiersch's solution (boro-salicylic lotion) is still more necessary.

But another form of infection, that by dissemination of the tuberculous virus from the wound throughout the general circulation, directly produced by the mechanical efforts connected with the operation itself, has to be also sedulously guarded

against. *Kanig* has aptly dubbed this form of infection as the "*operative dissemination of tuberculosis.*"

Whenever Esmarch's bandage can be used, the possibility of the absorption of tuberculous material detached by the scoop or knife is safely precluded. In the shoulder and hip joints, however, special precautions must be taken.

First of all the employment of rough force by excessive pressure by means of retractors, the use of blunt methods of preparation where clean work with the knife is preferable or admissible, in short, all vigorous manipulations are to be avoided. Ample incisions will obviate the necessity for this too forcible and injurious way of exposing the parts to be operated on. The knife should be relied upon to divide resistant tissues, and the elevator should not be used for anything except the peeling up of the periosteum, where it is loosely attached to the subjacent bone. Whenever the scoop is used in removing granulations, carious bone or cheesy matter, a continuous and lively jet of irrigating fluid should at once wash away detritus thus detached.

The next point of great importance to be considered in connection with the subject of joint exsection is that of the *control of the hemorrhage*. The use of Esmarch's bandage is universally accepted on account of its great advantages; but a few remarks made in reference to the special way of securing all advantages of Esmarch's apparatus in performing exsections may not be amiss.

The expulsion of blood from the limb by means of the application of an elastic roller bandage previous to the adjustment of the constricting band (in place of the tourniquet) is not only unnecessary, but even injurious. The expulsion of all blood from the limb robs the surgeon of a ready means of recognizing and deligating all, even the smallest bloodvessels, as soon as they are cut. On the other hand, if the limb is depleted only to such an extent as will be brought about by vertical elevation preceeding the application of the constricting band, two advantages will be secured: First, no infectious matter will be driven into the circulation by the forcible pressure of the elastic band; and secondly, the effusion of a small quantity of blood will readily serve to locate the place where

a vessel had been injured, the hemorrhage, there being no *vis a tergo* present to propel the column of blood, will be minimal, as atmospheric pressure safely prevents the escape of any contents of the bloodvessels, except those that are to be found in the immediate vicinity of the aperture made in the vessel by the surgeon.

As soon as the operation is completed the wound is united by catgut sutures; when there are a number of sinuses that can be utilized as drainage holes, no drainage tubes need be inserted. Where no sinuses exist, one or two short pieces of rubber tubing should be placed just within the wound cavity.

After a final flushing out of the wound, a strip of well disinfected rubber tissue protective is placed over the line of union, and the joint is enveloped in a compress of iodoformized gauze and an ample mass of corrosive sublimate dressings held down by a sufficient number of rather tight, compressive turns of a gauze bandage. Support of the limb is derived from a pasteboard—veneer—or plaster of Paris splint.

While the limb is held vertically, Esmarch's band is removed, whereupon the return of circulation is announced by the bright pink flush which is seen to overspread the exposed parts of the limb. As long as this hyperæmia is seen to exist, the vertical posture of the limb must be maintained by support or suspension. As soon as the toes or fingers resume their natural color, the extremity can be brought into the horizontal position.

Should blood be seen to penetrate the dressings, Martin's elastic bandage is to be applied to serve the purpose of additional compression. In two or three hours, when coagulation of the effused blood may be safely assumed, the elastic bandage and, when needs be, the external parts of the antiseptic dressing are to be removed and the latter renewed.

I have used this method for the control of hemorrhage since 1877, and never in any case had to regret its employment.

In exsections of the shoulder and hip joints, the impossibility of taking advantage of Esmarch's band will necessarily modify our procedure. Every vessel must be secured here, if possible, before, or at least immediately after it is cut. As the extent of the wound is large, and the oozing profuse, further

loss of blood must be checked by tight packing with iodoformed gauze, which at the same time will serve as drainage. Silver wire or silkworm gut sutures should be made, but left unknotted. After this the joint is to be dressed as usual. Three days after the operation the packing is withdrawn with or more commonly without the aid of an anæsthetic, and the sutures being knotted and thus the edges of the wound approximated; the wound is enveloped in a dry antiseptic dressing. Primary union of the contiguous surfaces follows then almost without exception. The credit for devising this form of secondary suture belongs to Kocher of Berne.

The *after-treatment* of exsection wounds is, in the main, determined by the question: *Is mobility or ankylosis desirable in a given case?*

Where, as for instance in the *knee-joint*, firm, bony ankylosis is aimed at, the first dressings and splint should remain undisturbed, if possible, for at least three or four weeks. My rule was heretofore to remove the first dressings on or about the thirtieth day after the operation. Then the nails or wires used for fixation should be withdrawn, and a light, preferably a silicate of soda, splint should be applied over the dressings protecting the remaining apertures. The patient should be directed at once to walk about on crutches, as experience has shown that a tardy process of ossification at the site of the bony union is hastened by this gentle mode of irritation.

The hip joint, in which a short, firm ligamentous union, permitting a limited amount of mobility, is considered as the most desirable result after exsection, will also have to be maintained in a long continued state of rest. Buck's weight extension in a moderately abducted position is the most convenient one. Eight, ten or even twelve or more weeks of rest are necessary; at any rate, locomotion must not be permitted, as a rule, as long as fistulæ remain. As soon as the wound is firmly healed the patient may begin to walk with the support of a Taylor's splint, which is to prevent the displacement upward of the trochanter so often marring the final functional result, when this precaution is regarded. The wearing of some apparatus for at least a year after the operation is generally

considered necessary except in cases of manifest bony ankylosis.

At night, weight extension with abduction is to be maintained also for some time, say for a period of from three to six months, or at least as long as any tendency to the re-assumption of a vicious position in *adduction* or flexion upon the pelvis is visible.

In the *elbow*, where normal mobility is aimed at, absolute fixation by splint should continue only until the drainage tubes are withdrawn, and the incisions are firmly healed. *Passive*, but especially *early passive motions*, so warmly recommended by older authors, *are harmful*, and not be compared as regards their value with *active exercises*.

The disadvantages of early passive motions can be summed up in this: Before the re-establishment of the normal condition of the tissues pertaining to an exsected joint—that is, before the disappearance of the swelling and rigidity of the soft parts—all motions, active and passive, will be painful. Active motions, however, will be limited to a harmless compass by the pain forbidding extensive movements; but passive motions, done without regard to the pain and struggles of the resisting patient, will be, and as a matter of fact, often are carried far beyond the limits of harmlessness. The forcible stretching and crushing together of the rigid and succulent, newly formed connective tissue are inevitably followed by minute ruptures and lacerations. Renewed extravasation and exudation and a diffuse state of adhesive inflammation are set up, which will cause the persistence or even an increase of the painful swelling and induration primarily present about the exsected joint. The greater the surgeon's energy, the worse the result, and in many cases ankylosis is brought on by the very measures intended to prevent it.

If, on the other hand, the surgeon patiently awaits the time of spontaneous detumescence, which with antiseptic measures and fixation, will occur at about the fourth or fifth week after the operation, gentle motions will cause no pain, and will encourage the patient to active exercise of the joint. The pain felt on excessive movement will serve as a wholesome check against undue zeal; the improvement of nutrition due to

active exercise, will hasten the definitive involution of the inflammatory products. Thus, day by day will the strength and amplitude of the active movements be increased, and by dint of painless attrition new articular surfaces will be ground and polished into shape. Massage and faradism, have to do their part in augmenting the nutrition and strength of the atrophied muscles, and if, on account of great loss of bone, lateral mobility is excessive, a properly constructed angular, articulating splint should confine the motion to one plane.

Many more details of great practical importance have to be observed in aiming at a good final result after joint exsection; but I must content myself with a bare outline of the principles that govern our efforts in this direction.

Before concluding my remarks I must not omit to mention a procedure now generally known under the name of *revision* that by common acceptance has crystallized into the term by which all complementary or subsidiary steps are understood, which may, and often do become necessary to bring exsection to its complete and final result or cure. Formerly exsection wounds were considered to be "healed," although one or more sinuses persisted; now-a-days the professional standard has been raised to the truer and better one of the layman professing common sense, who refuses to consider a wound "healed" as long as it continues to discharge.

In exsections practised on children especially, relapses in the wound of the tubercular process are very frequent on account of the surgeon's desire to preserve as much as possible of the joint. Small particles of diseased tissue being thus left behind, the discharges are contaminated, and often the whole wound surface becomes reinfected by tuberculosis. The exuberant deciduous granulations visible at the margins of the persistent sinuses, and the flocculent, thin discharges announce the fact within three weeks after the operation. A vigorous exhibition of the scoop under full anæsthesia, repeated if needs be every ten days, will soon terminate the process. The wounds will contract more rapidly, and the final healing will be much hastened by one or more of these harm and dangerless supplementary operations.

In cases exhibiting a condition of widespread destruction of

the tissues, in which exsection being tried as a forlorn hope suppuration with continued fever and hectic follow, amputation should not be delayed until amyloid changes of liver and kidneys render the chances of final recovery very doubtful.

NOTES ON WRY-NECK AND ITS TREATMENT.

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THERE is a certain ambiguity about the term "wry-neck" as about many other terms in the nomenclature of disease. A name is given to a roughly defined group of symptoms, or, perhaps, to one well-marked symptom. Time and observation differentiate several distinct, perhaps vitally distinct and contrasted, pathological conditions at the bottom of different cases respectively. If a minority of cases are found to depend on a disease far more serious than the original symptom which has attracted attention, there will be a tendency to cease to view such cases after the mere symptom, and to associate them rather with other cases of the primary disease. Hence there are few surgeons who now follow the old-fashioned practice of speaking of a case of cervical caries as a form of wry-neck.

Again, when, from its comparative commonness, its intrinsic interest, and the regularity of its symptomatology, one particular pathological condition seems to demand a distinct name all to itself, it is apt to arrogate to itself exclusively the name which, in time of vague pathology, it shared with other conditions different essentially, though similar superficially.

For these reasons, contracture of the sterno-mastoid is coming more and more to be regarded as the only affection having a thorough claim to be called "wry-neck"; and even cicatricial contractions of the skin after burns, whatever may be the po-

sition in which they place the head, are now seldom granted the name in question.

Therefore, by "wry-neck" I mean contracture of the sterno-mastoid.

In certain cases wry-neck may be foreseen and prevented. When, after birth, a child is found to be suffering from an injured sterno-mastoid, the muscle should be frequently and gently rubbed by the nurse with oiled fingers, and every day its head should be, for a few minutes, slowly and gently bent away from the shoulder of the side affected, while the face is turned toward the same side. In these manipulations she should be regularly instructed and superintended by the surgeon, who should on his visits practise the movements himself.

When a wry-neck has actually developed, the sooner the sterno-mastoid is divided the better. Exceptions to this rule are rare. They occasionally present themselves in the cases of very fat infants with short necks. Instrumental treatment without myotomy is a very tedious and expensive affair, and it has seemed to me when watching it in the practice of other surgeons, to be not as effective as it has been represented. It sometimes happens that the poor child falls into the hands of some instrument maker "of the baser sort" who assures the parents that the use of an (of course costly) appliance, under his superintendence, or, perhaps, under no superintendence at all, will cure the child. Or resort is had to the bone-setter, who diagnoses a small bone out of joint in the neck. Recently I have seen a child on whose poor little head (and neck) both these calamities have fallen.

It is desirable not only to cure wry-neck, but also to cure it quickly, so as to stop without delay, as far as possible, the continuous development of asymmetry of the face, head, and even of the shoulders,—which secondary deformity is scarcely less disfiguring than the wry-neck itself.

THE OPERATION.

1. *Subcutaneous Division of the Sterno-Mastoid.*—Dupuytren who first divided the sterno-mastoid subcutaneously, did so by passing the knife beneath it and cutting towards the skin, and

that is the safer plan, as, if the knife should slip, it had better cut through the skin than into the vessels underlying the muscle.

Except in the case of an unruly child, distending its jugulars by screaming, crying, and struggling, anæsthesia is superfluous.

The patient lies down with the neck and shoulders raised on pillows, and the head securely held by an assistant. The tenotome and the skin should be cleansed and asepticated, especially in the practice of a general hospital, where instruments are frequently applied to purposes for which they were not originally intended, and the employment of the tenotomes and cataract knives to open small abscesses and inflamed cysts is a thing not unheard of. Supposing the tenotome to be inserted at the inner edge of the sternal head of the muscle, the surgeon should simultaneously press the end of one finger of his left hand to the other side of the same sternal head and, as it were, beneath it. With this finger he feels the point of the knife (of course through the skin), when he has insinuated the blade on its flat beneath and close to the deep surface of the muscle. When the division is made in the ordinary way with the assistant's help the snap is very marked. The clavicular origin has now to be inspected. In a considerable number of cases it is little if at all affected. If tense it should be divided in a similar manner to that already indicated for its sternal head. Care must be taken to avoid the anterior external jugular.

When both heads of the muscle have been divided, if, as sometimes happens, other bands spring into reach and prevent reduction of the deformity, we are told to go on cutting them subcutaneously. I have shrunk from doing so. On the contrary, following Volkmann I make an open wound and see what I am doing, working antiseptically.

2. *Open Division of the Sterno-Mastoid.*—The muscle itself or any part of it can be divided openly. The skin, fascia etc., should be incised perpendicularly for about two inches and the edges pulled apart with retractors. The prominent and comparatively superficial muscular and fibrous structures may be divided without ceremony, but as the deeper parts are ap-

proached, while an assistant keeps the wound perfectly clean and dry with thorough sponging, the operator should rather scratch with the point of his knife or *nibble*, as it were, with the points of a pair of scissors until he has divided every obstructive and tense fibre. If he went too far it would be possible that he might puncture one of the large vessels; that, however, would be very unlikely with the method I am recommending; and it is inconceivable that he could accidentally *nibble* a *large* hole in the jugular.

But, whatever operation one may be doing, it is necessary in order that one may go about it coolly, happily, and with never failing presence of mind, to be prepared for the worst. Therefore, whenever I am operating near the great veins of the neck I always have at hand a jug of pure warm water and a supply of iodoform gauze. Were there any sign of air entering a vein I should fill the wound with the former according to the plan recommended by Mr. Treves. If one of the jugulars should be punctured, probably a compress of iodoform gauze would be the handiest and most satisfactory thing to which to resort.

I use a small drainage tube, removing it about the fourth day. The skin should be sutured carefully with a view to preventing an ugly scar. Whatever antiseptic dressings are used, they should be made snug by the free use of good strapping, and if they are to be kept in place, it is essential to fix the head and neck from the first with some form of appliance.

When Dupuytren had done the first subcutaneous section of the sterno-mastoid, he fixed the patient's hand to her foot of the same side, just as in the lithotomy position. I am not aware that any one since has applied counter extension to the arm either in this or in any other way. And yet it seems a rational plan. I was not acquainted with Dupuytren's method, which has the advantage of being simple, though, perhaps, rather irksome, when I contrived and practised the mode of extension which I am about to describe and recommend.

Extension and counter-extension are made by weights attached by adhesive strapping to the head and upper arm respectively. From a wooden yoke or stirrup above the head, passes down on each side a piece of strapping which covers the correspond

ing side of the head, the parotid and mastoid regions and the neck to just below the level of the jaw, but does not reach its fellow of the opposite side below the chin. A hole is cut on each side just large enough to let the ear through. A narrower circular band of strapping encircles the head immediately above the ear and eyebrows. Strapping of the best quality must be used.

The weight extension is applied to the upper arm exactly in the same manner as that in which it is affixed to the leg for the treatment of hip disease by extension. The patient is left free to use it, and generally holds it spontaneously in the flexed position.

Commencing with four pounds each, both the two weights should be gradually increased until in a week they equal seven pounds each or more, if an increase of weight can be borne and appears to have any beneficial effect. Of course, regard must be had to the size and strength of the child. It is worth while to keep up this weight extension for a month. A fortnight after operation manipulations may begin, the weights being temporarily removed for that purpose.

When the weight extension is given up, the manipulations must be regularly continued for some months more. When they are at last dispensed with, the patient should be occasionally seen, and at the least sign of relapse, manipulations should be recommenced.

ANTISEPTIC SURGICAL PRECAUTIONS OF SPECIAL IMPORTANCE TO THE GENERAL PRACTITIONER.¹

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IN contemplating an operation of any importance, it is the duty of the general practitioner or country surgeon to take into consideration the medium, the surroundings, in which it is going to be performed and to do his best in the way of getting them into an aseptic condition. In case of a somewhat large operation in a private house, first a few questions should be asked in regard to the hygienic antecedents of the house in general, and of the different rooms in particular. Many times nothing useful might be elicited, but if it were learned that in the particular room, selected for the operation, a woman had died some time previous from puerperal fever or a child had been sick with scarlatina, or somebody had been down with erysipelas or diphtheria, then care taken with regard to a point so commonly overlooked would be a matter of self-gratulation.

When no especially unfavorable information is received, the safest operating room in the average farm, or private house, is the parlor, or amongst people a little better situated, a spare bed-room.

Now, how should such a room be properly prepared for an operation—for instance, an abdominal section? From the parlor, the carpet and the upholstered furniture should be removed, and the walls and ceiling should be gone over with a strong duster or a soft broom—if they cannot be kalsomined or papered. The floor, doors and windows should be washed with soap and brush. After that the windows should be left open day and night for as many days as possible. And then again—if in Summer with dust and insects flying around—another general cleaning and washing of the room the day pre-

¹A portion of a paper read before the Northwestern Interstate Medical Association, June 7, 1887.

vious to the operation. On the evening before the day of the operation, the operating and other tables, chairs, bowls, pitchers, pails, should be brought into the room—everything plain, wooden or earthen, and scrupulously well washed with warm water, soap and brush in all cracks and corners—and, furthermore, the newly washed sheets, blankets, the oil-cloth for dressing the operating-table (no pillow!), the towels, the clothes to change on the patient after the operation, all the dressing material—in its packings—the instrument-trays, sponges, jars, the bottles containing the antiseptic solution—in short, everything which the operator or his assistants might have to or happen to lay their hands on during the operation, except the instruments and the patient.

As stated, everything ought to be most thoroughly cleansed before being brought in. The sheets, blankets, towels, operating gowns for the doctor and his assistants and all similar things ought to be unfolded and hung on chairs or lines in order that the coming final disinfection may reach every part of them.

For this final disinfection of the room and its contents, one of the most efficacious, as well as an extremely simple proceeding, is fumigation with sulphurous acid gas, which is performed in the following way:

All the windows and doors in the room are diligently closed, and one of the windows arranged in such a manner that it may be opened from the outside in order to let the gas out before people enter the room. The room is measured and about one ounce of sulphur is used to each cubic yard in the room. The sulphur is crushed into small pieces and mixed with a few, wooden flinders placed in a small sheet-iron cup, which, to prevent danger of fire is placed in a larger pan filled with sand. It is lighted the evening before the operation, and the room remains closed until the following morning when, the window is first opened and afterwards, when the most of the gas has escaped, the room may be entered.

This manner of disinfecting a room has been found more efficacious than, for instance, the use of chlorine gas, and is to-day the best generally available method known.

Next comes the preparation of the patient. For a week or

so preceding the operation, the patient, if circumstances will allow, ought to be bathed with soap and water repeatedly. Especially is this desirable when the patient belongs to that class of people in which cleanliness is not considered to be one of the more important virtues. If he cannot be given a bath he should be washed and brushed all over, especial attention being given to the field of operation, the hair and beard, the armpits, pubes and feet. After each such cleansing his linen and bed-sheets ought to be changed. All this, it must be remembered, to be varied more or less, according to the kind and magnitude of the operation and the time which may be available.

In all cases the patient should be bathed and his underwear and bed-sheets changed on the evening previous to the operation. And in this same attire he is, on the next morning, to be anæsthetized and put on the operating-table.

Here the field of operation—that is, every part which must be left uncovered during the operation or which after the operation will be covered by the dressing—is shaved (or this may conveniently have been done the evening before), thoroughly soaped and brushed and dried and then sponged off with a strong antiseptic solution, or still better, for fifteen or twenty minutes covered with a compress formed by a folded towel soaked in a 1 or 2 *pro-mille* corrosive sublimate solution, which is considered a perfectly reliable germicide to the parts which it touches when it is brought into contact with them for the space of time mentioned. A further precaution, especially in localities where sebaceous glands abound, is to bathe the operating field with ether, benzine or spirits of turpentine in order to remove the sebum, which may contain micro-organisms protected by it from the action of aqueous antiseptic solutions. It is also desirable to disinfect in a similar way one of the patient's wrists in order that the operator may, at any time, be able to observe the patient's pulse without contaminating his fingers. If the assistant giving the anæsthetic wishes to watch the pulse also, he must make use of the other wrist.

Parts of the body or extremities neighboring to the field of operation, so that the hands of the operator or his nearest

assistants might be apt to fall upon them should be thoroughly covered and enveloped in sheets or towels, either simply disinfected with the room, or, when deemed prudent, wrung out in and during the operation repeatedly sprinkled with some antiseptic solution. In operating on the extremities the last proceeding seems to be the best, but in most cases I would hesitate to place such a wet compress for any length of time around a patient's abdomen, chest or neck, being afraid that the great loss of body heat, caused by the evaporation from so large a surface, might contribute to a dangerous extent towards collapse together with the other concomitants of a large operation—the anæsthesia, the loss of blood and the shock.

When the operation is to be performed in the vicinity of one of the natural openings, some special precaution must be taken to prevent, if possible, an accidental soiling with urine, fæces, saliva or vomited material, and it must be conceded that a satisfactory antiseptis, in those localities, is very often beyond reach. In operations on the neck, where the hair cannot be cut short and thoroughly disinfected, as for instance, when removing tuberculous glands from young lady patients, the hair, after being washed and disinfected as thoroughly as possible, ought to be completely covered and secured in a cap or towel, which, during the operation, is kept impregnated with some strong antiseptic solution. This is necessary, because, under this and similar operations, the operator himself will unavoidably have to handle the head, move it in different positions, etc.

The patient having thus been made ready, how should the operator and his different assistants prepare themselves?

The ideal aseptic operator would very likely be a man who stepped into the operating-room directly from a Russian or Roman bath, simply dressed in a disinfected operating-gown and with a pair of sandals on his bare feet. And it would hardly be surprising if something like that was proposed and executed in the near future by some logical, consistent, antiseptic enthusiast, in some new hospital. But in the circumstances kept in view by this paper, much less will have to suffice.

Every practitioner who is occasionally occupied with surgery ought to keep a constant eye or rather thought on his clothing, and mentally note what clothing he wore when he happened to be called to a case of diphtheria, erysipelas, pyæmia, puerperal fever, or scarlet fever or when he made a post-mortem examination. In clothing worn on such occasions, he should not go to an important surgical operation or to a surgical dressing, unless a good long time had elapsed, and the clothes had been beaten and brushed and hung out in the fresh air and sun-light for several whole days. It must always be remembered what powerful germicides we have in the moving fresh air and in the sun-light. Most micro-organisms thrive the best in darkness, moisture and close air, like the fungi in cellars.

Before entering the operating-room the surgeon should remove his coat and vest, his underclothing, of course, being clean, and thoroughly wash his head, face and hands, paying especial attention to his hair and beard. Furthermore it can hardly be considered consistent with good antisepsis for an operator or his assistants to walk into the operating-room in the shoes which they have been wearing on the streets and in the yards immediately previous. A pair of house-slippers would practically meet the requirements.

To take a general bath immediately previous to the operation is something which I might insist upon for some of my assistants, *outside* (the nurse for instance), and occasionally, *inside*, of the profession. But for a man with regular cleanly habits any special preparation of that kind is hardly necessary.

After this preliminary preparation the operator (or some of his trusted assistants), proceeds with the cleansing of the field of operation and other preparation of the patient. After this is done he finally disinfects his hands and puts on the operating gown. The hands and fore-arms should be again thoroughly washed with soap and water, using a stiff brush freely, paying particular attention to the folds and creases of the fingers and under the nails. The hands are then dried off on a disinfected towel and, immediately before the commencement of the operation, washed in a 1 or 2 *pro-mille* corrosive

sublimate solution or in spirits of turpentine. Afterward also, in the course of the operation, the operator and his first assistants ought occasionally to dip their hands into some antiseptic solution—conveniently the sponge bowl—and especially before going deeper into the wound, or, for instance, the abdominal cavity, with an exploring or operating finger.

The disinfected operating-gown is made of white cotton or muslin, not too thin, long enough to cover the person almost to the feet, with the front whole, and buttoned or tied behind, and best provided with a continuous cap to cover the hair. The sleeves are to be folded back and tied above the elbows. The gown is provided with an outside pocket for the handkerchief, which must be fresh from the laundry, and which should not be used at all during the operation if possible to avoid it.

It may not be superfluous here to mention, that all those employed at an operation ought previously to have accomplished their *functiones naturales* in way of defæcation and micturition, as a cogent desire in that direction will at least make the operator nervous and hasty. For him to interrupt an operation, or for an assistant to leave the room in order to satisfy these functions, must be considered inadmissible.

During the operation the operator and his nearest assistants must remember that to cough, sneeze, laugh, or even to talk much while bending over the wound is inconsistent with good antiseptis. It has been found on investigation that the ordinary expired air contains surprisingly few, and presumably rather innocuous micro-organisms, but under more forcible expiratory action particles of saliva or mucus from the mouth and nose, are apt to be carried off, and they are full of noxious organisms. Furthermore, great caution should be exercised against such thoughtless acts, as, in attempting to thread a needle, biting the end of the thread, or smoothing it between the lips, or putting an instrument in the mouth for temporary safe-keeping.

Of the assistants only those assisting in the wound or handling the instruments, ligatures and sponges are supposed to be perfectly aseptic, dressed in operating-gowns and being very careful about permitting their hands to come in contact with anything impure—as for instance inserting the hand under the

operating-gown into a pocket and to leave watches, door-knobs, windows and uncovered furniture alone. The anæsthetist and his assistants, which he ought to have in every operation, of long duration, whose duty is to help hold the patient in position, the nurse bringing hot and cold water and the spectators, do not need operating-gowns, and are not supposed to be perfectly aseptic about their hands, but should otherwise have taken all due precautions in the way of cleanliness, and should keep themselves as much at a distance as consistent with their functions.

With regard to assistants in the wound every operator should emancipate himself from their aid as much as practicable and himself do as much of the sponging, retracting, ligating and other handling of the wound as possible without retarding the operation. It is plain that the danger of infection, notwithstanding all preventive measures, increases in direct proportion to every new hand or finger which goes into the wound, and it is believed that surgeons generally will find upon trial that most of the conventional assistance of this kind can be readily dispensed with.

Until lately surgical antisepsis had chiefly to do with the preparing of instruments, sponges, ligatures, sutures and dressing material, while the measures here touched upon were more or less overlooked. Therefore the different methods of preparing these articles are better known and more generally practiced, so that a discussion of them may properly be omitted.

AN EXPERIMENTAL CONTRIBUTION TO INTES-
TINAL SURGERY WITH SPECIAL REFER-
ENCE TO THE TREATMENT OF
INTESTINAL OBSTRUCTION.¹

(CONTINUED.)

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THE many failures which attended jejuno-ileostomy and ileo-ileostomy by lateral apposition and suturing led to the use of perforated approximation discs. A great contrast was observed in the animals operated upon by these two methods. The operation by suturing required usually more than an hour, and almost all of the animals showed more or less symptoms of shock after its completion, and not a few succumbed to its immediate effects: while the operation by approximation plates could always be finished within twenty minutes, consequently, the animals never suffered seriously from the immediate effects of the operation. The first experiments were made somewhat carelessly and with crude material, and yet it was observed that the healing process progressed more favorably and was accomplished in a shorter time than after suturing. The approximation discs brought into uninterrupted contact, large serous surfaces without impairing the vascular supply, at the same time they secured for the parts destined to become united an essential condition for rapid wound healing—rest—by serving the useful purpose of splints.

Experiment 63.—Dog, weight 15 pounds. Ileum was completely divided at its junction with the jejunum and both ends of the bowel closed by invagination, and three stitches of the continued suture. An incision was made on convex side of bowel about two inches from

¹Read in the Surgical Section of the Ninth International Medical Congress, Washington, September 5, 1887.

the closed ends, and a heavy perforated lead plate to which six catgut sutures were fastened around the oval perforation was introduced into the lumen of the bowel of each closed end, all of the catgut sutures being brought out through the incision. The two wounds were brought opposite each other and the six sutures tied. The serous surfaces of the two intestines over a surface corresponding to the size of the lead discs were thus brought into accurate apposition. The sutures were cut short and the ends buried as deeply as possible. The condition of the animal remained excellent until the time of killing, 75 days after operation. Omentum adherent to wound; large intestines distended with normal fæces. Bowel above and below point of operation normal in size and structure. New opening between ileum and jejunum large enough to admit the little finger to second point. Bowels firmly united by a broad surface. Above the communicating opening a double flexion of the bowel was found which apparently had done no harm.

Experiment 64.—Dog, weight 18 pounds. Operation done in the same manner as in the last experiment, only that instead of lead the discs were made of sole leather, and the sutures used were linen in place of catgut. For a few days the temperature was higher than normal and appetite diminished. After fourth day the animal appeared to be in excellent condition and remained so for three weeks, when the appetite failed and occasional attacks of vomiting set in. These symptoms remained more or less prominent until the time of killing, 39 days after operation. Omentum adherent to abdominal wound; extensive intestinal adhesions at site of operation; union between intestines perfect. On incising the bowel it was found that the plates had sloughed through and had passed along the distal portion of the bowel, leaving an opening the size of the plates, the margins of which had almost completely cicatrized. The two leather plates still held together by the linen sutures were found three feet lower down in the ileum where they had become embedded in a mass of hair, straw and fæcal matter, and quite firmly impacted, causing complete obstruction of the bowel. The intestine above the seat of obstruction was enormously dilated, while below the seat of impaction it was empty and contracted. Large intestines likewise empty and contracted. The cause of the illness was evidently due to intestinal obstruction produced by the impaction of the large enterolith in the centre of which the leather discs were found.

Experiment 65.—Dog, weight 10 pounds. In this instance the bowel was divided near the junction of the jejunum with the ileum,

both ends closed and its continuity established by incising the convex surface of both ends and approximating the wounds by two perforated bone plates tied together by silk ligatures. The animal died 14 days after operation. During the last few days symptoms of intestinal obstruction were present. Abdominal wound completely united. Numerous intestinal adhesions at site of operation. Bone plates still *in situ* and firmly fixed. On proximal side perforation of bone plates completely closed by hair and fragments of bone, giving rise to complete intestinal obstruction. The bowel above this point was greatly dilated, while on distal side it was empty and contracted. Adhesions between the two intestinal surfaces included by the bone plates firm. Intestinal obstruction by a mechanical arrest of portion of the intestinal contents above the proximal plate had caused death before a more efficient communication could be established by sloughing through of the bone plates.

Experiment 66.—Dog, weight 30 pounds. Ileo-ileostomy by dividing the ileum near its centre, closing both sides, and after incising both ends on convex surface, brought wounds in apposition by perforated plates of cross-grained walnut wood, which were tied together with silk sutures. The dog remained in perfect health and was killed 18 days after operation. External wound completely united. Plates had become detached, leaving a communicating opening 2 inches in length. Blind ends of bowel empty; no trace of plates could be found.

Experiment 67.—Dog, weight 24 pounds. Double ileo-ileostomy. Ileum divided transversely five inches above ileo-cæcal region and both ends closed by invagination, and three stitches of the continued suture. Lower and upper end of bowel were again brought into communication by incision on convex side and lateral apposition of wounds by means of perforated approximation plates of decalcified bone, hardened in alcohol. The plates were fastened together by four silk sutures, all of the threads being brought out of the incision, tied and cut short. Above this point a loop of the ileum was made by bringing the convex surfaces into apposition after incision at two points, and introducing perforated gutta percha plates which were retained in place by four silk sutures. No fever or symptoms of obstruction followed the operation. Animal killed 13 days later. External wound firmly united. No evidences of peritonitis or intestinal obstruction. First operation left a communicating opening large enough to admit the little finger in one of its margins. The silk ligatures which had become detached from the plates had embedded themselves. The

decalcified bone plates had disappeared and no trace of them could be found in any portion of the intestinal canal lower down. The second operation was 30 inches higher up. Gutta percha plates remain *in situ*, although somewhat loosened by the gradual disappearance of the intervening tissues by pressure atrophy. Adhesions between the two surfaces of the bowel firm and extending a little beyond the line of approximation. The perforation in the proximal plate almost completely closed by an accumulation of hair. The entire ileum normal in size and appearance.

Experiment 68.—Dog, weight 54 pounds. Transverse section of ileum 30 inches above ileo-cæcal region and closure of both ends in the usual manner. The two closed ends were overlapped 4 inches and brought into communication by two longitudinal openings which were approximated by being buttoned together with a shuttle-shaped button, nearly $1\frac{1}{2}$ inches in length, the sides being lead plates and the shaft a rubber tube through which the anastomosis was established at once. As the margins of the intestinal wounds showed a tendency to evert, a fine catgut suture was inserted on each side embracing only the peritoneal coat. Only for two or three days after the operation did the dog not appear to be well. Killed 23 days after operation. Omentum adherent to abdominal wound which was firmly united. Omental adhesions to intestine at site of operation. Intestinal anastomosis 30 inches above the ileo-cæcal valve. Proximal blind end of bowel five inches in length adherent to distal end, considerably dilated and contains fragments of bone and other crude substances. Approximation button *in situ* and quite firmly fixed. A fragment of bone partly fills the lumen of the rubber tube. Coaptated peritoneal surfaces firmly adherent. The obstruction of the communicating tube had given rise to dilatation of the bowel above the point to twice its natural size, while below the seat of partial obstruction the intestine appeared empty and contracted.

Experiment 69.—Small dog. In this experiment the ileo-ileotomy was made by lateral apposition by perforated approximation plates of partially decalcified bone tied together by four catgut sutures. The lateral sutures were passed through the margins of the wound near its border, a modification of the usual procedure, which not only fixed the plates firmly in their places, but also prevented ectropium of the mucous membrane, and ensured free patency of the new opening by retracting the margins of the wound, so that the longitudinal slit is at once transformed into an oval shape. The animal showed no unfavorable symptoms and was killed 29 days after operation. Dog well

nourished. External wound united. Omentum adherent to wound and intestines. The proximal blind end of bowel contained one of the bone plates which showed signs of softening and disintegration. The bone plate in the distal end had been passed with fæces previously. The new opening perfect and sufficiently large to equal in size the lumen of the bowel.

Experiment 70.—Dog, weight 12 pounds. Made ileo-ileostomy the same as in the last experiment, using decalcified, perforated bone plates, which were tied together with four catgut sutures, the lateral ones being passed through the margins of the wound. An omental flap was used to cover the sides of the bowel where approximation had been made. This flap was retained by two fine catgut sutures. No unfavorable symptoms. Animal killed 23 days after operation. Omentum adherent to distal blind end. Omental flap in position and firmly adherent. Site of operation 14 inches above ileo-cæcal region. Both bone plates had disappeared and no trace of them could be found. Some hair had collected in the blind proximal end. New opening large enough to admit the index finger.

REMARKS.—Jejuno-ileostomy and ileo-ileostomy by internal apposition with decalcified perforated bone plates in cases of complete obstruction of the bowel artificially produced is an operation almost devoid of danger. Partially or completely decalcified bone plates hardened in alcohol remain firm for a sufficient length of time to answer the purpose of retentive measures until firm adhesions have formed between the serous surfaces held by them in approximation. Until it was ascertained by experiment that the plates would undergo softening and disintegration in the course of a few days, catgut sutures were used to hold them in place with the expectation that the plates would become detached and escape with the intestinal contents as soon as the sutures would give way. Experience, however, has shown that aseptic silk threads are preferable to catgut, as they can be tied with greater accuracy and the knots will never become loosened, while the approximation discs disappear completely by softening and disintegration in a few days. Approximation plates of inabsorbable material as lead, wood, leather, bone, and gutta percha, fastened together by silk or linen sutures remain *in situ* until the interposed tissues disappear by pressure atrophy, and the opening that results

corresponds in size to the dimensions of the plates. In the first experiments the plates were tied together by six sutures, but it was found that four sutures answered the same purpose. As a rule, the plates were about $2\frac{1}{2}$ inches in length, and their width corresponded to one-third of the circumference of the bowel. The greatest advantage to be found in the method of restoring the continuity of the intestinal canal by lateral apposition by approximation discs consists in the fact that the point of contact is always made on the convex surface of the intestines, so that the means resorted to to secure coaptation do not interfere with the blood supply from the mesenteric vessels. As this method requires much less time than any form of circular enterorrhaphy, and has been followed almost without exception by recovery, it recommends itself strongly as a substitute for the latter procedure in many cases where loss of time constitutes an important factor in the issue of the case, or where from other causes circular suturing appears impossible or impracticable.

3. ILEO-COLOSTOMY.

As the ileo-cæcal region is frequently the seat of intestinal obstruction it becomes desirable to devise some definite plan of operative treatment in cases where the cause of obstruction is not amenable to removal with a view of establishing the continuity of the intestinal canal, thus avoiding the necessity of resorting to the formation of an artificial anus. To accomplish this object two distinct methods were followed: (1) Division of the ileum with closure of distal and implantation of proximal end into colon. (2) Division of ileum, closure of both ends and lateral apposition of proximal end with colon, and the formation of an intestinal anastomosis by suturing or approximation discs.

(a) ILEO-COLOSTOMY BY IMPLANTATION.

Experiment 71.—Dog, weight 38 pounds. Intestinal anastomosis by implantation of the ileum into colon. The ileum was divided transversely just above the ileo-cæcal region, and the distal end closed by invagination and 3 stitches of the continued suture, and dropped

back into the abdominal cavity. A longitudinal incision in size corresponding to the lumen of the ileum was made in the ascending colon at a point directly opposite the mesenteric attachment, and the proximal end of the ileum was then fixed in this opening by Czerny-Lembert sutures. Only slight febrile reaction followed the operation. The appetite remained good and the discharges from the bowels were normal. The animal was in excellent condition when killed, 33 days after operation. Few circumscribed omental adhesions to abdominal wound, which was completely closed. Peripheral portion of ileum presents a conical appearance, and was found adherent to, and of the same length as the appendix vermiformis. Implantation had been done about the middle of the colon. Union at point of suturing perfect, apparently no interruption of continuity of peritoneal surface. The new opening into colon a little smaller than the lumen of the ileum. Around the margins of this opening, which somewhat resembles the ileo-cæcal valve, six of the deep silk sutures remain attached. Above the new opening the colon and cæcum were found empty and somewhat atrophic. Lower portion of the ileum and colon below the new opening appear normal in size and structure.

In the remaining experiments the implantation was made by lining the proximal end of the ileum with a narrow flexible rubber ring, which was retained in place by a continued catgut suture, embracing the free margin of the bowel and the lower margin of the rubber ring. The implantation was made by two catgut sutures threaded each by two needles and passed at opposite points from within outwards through the upper margin of the ring and the entire thickness of the bowel, while the needles were only passed through the serous and muscular coat of the colon. After both sutures were in place gentle traction upon all of the ends brought the end of the ileum into the incision in the colon, and the walls of the colon were drawn over the end of the ileum to the points where the needles emerged from the ileum, making really a limited invagination. When in proper position, the serous surfaces of the colon and ileum over a surface corresponding to the width of the rubber ring were in accurate coaptation, after the two sutures were tied. Only in exceptional cases was it found necessary to apply one or two additional superficial coaptation sutures. As in circular enterorrhaphy, so in these cases, the elastic pressure on part of the rubber ring rendered material assistance in maintaining accurate coaptation, while at the same time it secured rest for the sutured parts, and kept the new opening freely patent for the escape of intestinal contents into the colon.

This operation did not require one fourth of the time consumed in making an implantation by Czerny-Lembert sutures.

Experiment 72—Dog, weight 50 pounds. Division of ileum eight inches above ileo-cæcal region, distal end closed by invagination, and three stitches of the continued suture. Proximal end lined with rubber ring and implanted into incision of ascending colon by two catgut invagination sutures. The dog did not appear to do well after the operation, and died on the 5th day. Abdominal wound not united. Partial separation of implanted bowel and diffuse septic peritonitis from perforation.

Experiment 73.—Dog, weight 35 pounds. Ileum divided 12 inches above ileo-cæcal region, distal end closed and proximal end lined with flexible rubber ring and implanted into an incision in the transverse colon and retained by two invagination sutures of catgut. An omental flap an inch and a half in width was placed over the junction of the two intestines and fixed in its place by two catgut sutures. No unfavorable symptoms after operation. Animal when killed, 18 days later, in excellent condition. Omentum adherent to abdominal wound which was firmly united. Omental flap adherent all round. Colon above new opening ten inches in length, completely empty, contracted and atrophic. New opening oval in outline and as large as the lumen of the ileum.

Experiment 74.—Dog, weight 16 pounds. Division of ileum, closure of distal end and implantation of proximal into an incision of the colon by rubber ring and two invagination sutures of catgut. As the inverted portions of the colon showed a tendency to evert, two additional retaining sutures of fine catgut were used which secured perfect coaptation throughout. An omental flap was laid over the junction of the intestines and fixed in its place by one catgut suture. The dog remained in good condition, appetite unimpaired, and discharges from bowels normal. Killed 13 days after operation. Abdominal wound firmly united. Omentum adherent to wound. A number of adhesions between coils of intestine. Ileum somewhat dilated above the new opening. Omental flap in place and adherent. Union between ileum and colon perfect. A long, sharp fragment of bone was found lodged just above the new opening, its lower end partially occluding its lumen. The dilatation of the lower portion of the ileum was evidently due to partial obstruction from the presence of the foreign body in the new opening.

Experiment 75.—Dog, medium size. Section of ileum two feet above the ileo-cæcal region, closure of distal end in the usual manner

implantation of proximal end into colon by rubber ring and two invagination sutures of catgut. No omental flap. Animal remained well and was killed 43 days after operation. Omentum adherent to abdominal wound. Distal end of ileum conical in shape, the extremity presenting a cup-shaped depression, which was filled with cicatricial material. Omentum adherent at ileo-cæcal region and at site of operation. Union between the bowels perfect and their serous surfaces appear to be continuous over the line of junction. The new opening from the colon admits the little finger, and is surrounded by a prominent ridge of mucous membranes, which resembled the ileo-cæcal valve.

Experiment 76.—Dog, weight 14 pounds. Division of ileum a few inches above ileo-cæcal valve, distal end closed by invagination, and 3 stitches of continued suture. Implantation of proximal end into colon by rubber ring and two catgut invagination sutures. Over the junction of the two intestines an omental flap was placed which was retained by a catgut suture. The animal showed no unfavorable symptoms and was killed 23 days after operation. Omental flap retained and firmly adherent throughout. Point of implantation three inches above cæcum; union between the two intestines firm throughout. New opening corresponds in size to the lumen of the ileum, and is surrounded by a prominent ridge of mucous membrane which appears to be derived from the invaginated portion of the ileum.

Experiment 77.—Ileum divided a few inches above ileo-cæcal region, and after closure of distal, the proximal end was implanted into the colon in the usual manner by means of rubber ring and two invagination sutures of catgut. Animal died on the third day after operation. Wound partially united; a considerable quantity of sero-sanguinolent fluid in the abdominal cavity. Ileum almost completely separated from colon, and the portion which had been invaginated showed signs of gangrene. Rubber ring had disappeared; death from perforative peritonitis. In this case we have reason to believe that the rubber ring which was used was too large and that the gangrene and separation was due to injurious pressure.

(b) ILEO-COLOSTOMY BY LATERAL APPosition.

Anastomosis by this method was made after producing an intestinal obstruction of some kind at or near the ileo-cæcal region, and then by bringing the ileum above the seat of obstruction in communication with the colon below the point of

obstruction by making an incision an inch and a half to two inches in length in both intestines at a point opposite the mesenteric attachments, and uniting the wounds either by a double row of sutures or perforated decalcified bone discs. The first experiments were all made by suturing, but as in a circular enterorrhaphy it was found by experience that perforation not infrequently occurred along the track of one of the sutures, in some instances several days after the operation, at a time when union had taken place by firm adhesions. These unfavorable results led to the use of the approximation discs.

Experiment 78.—Dog, weight 25 pounds. The ileum was withdrawn from the abdomen through an incision in the linea alba and having emptied a loop of its contents acute flexion was made just above the ileo-cæcal region by approximating the serous surfaces of the convex side for an inch and a half by five catgut sutures. Two longitudinal incisions of equal size were made, one in the ileum six inches above the flexion, and the other in the ascending colon three inches above the cæcum. The visceral wounds were carefully united by Czerny-Lembert sutures, using silk for the deep interrupted sutures, and fine catgut for the superficial continued sutures. No untoward symptoms were observed after the operation; appetite remained unimpaired, and fæcal discharges were normal. The dog was killed 37 days after operation. Animal well nourished. No evidences of peritonitis. Bowel above point of obstruction nearly empty, and somewhat contracted as far as the new opening. Flexion permeable to a stream of water. Slight omental adhesions to bowel at site of operation; union firm throughout. Lumina of non-excluded portion of bowel normal in size above and below the flexion. Serous surfaces at point of junction appear perfect and continuous. On slitting open the colon opposite the new opening its outlines were seen to be marked by a prominent ridge of mucous membrane to which a number of the deep sutures remained attached. The opening was large enough to admit the tip of the middle finger. The excluded portion of the colon and the cæcum were somewhat contracted and atrophic and contained only a very small quantity of fæcal matter.

Experiment 79.—Medium-sized cat. About two inches of the ileum were invaginated into the colon through the ileo-cæcal valve, and the intussusceptum stitched to the neck of the intussusciens by two fine catgut sutures. Continuity of the intestinal canal restored

by incising the ileum above the obstruction and the ascending colon below the free extremity of the intussusceptum and uniting the wounds by a double row of sutures. The invagination caused no serious disturbance, and the animal remained in good health and was in excellent condition at the time of killing, 162 days after operation. A number of adhesions between the folds of the intestines near the site of operation. At point of junction of the two intestines the peritoneal surface presented a glistening and continuous surface. New opening an inch and a half in length, oval in outline and located five inches above the ileo-cæcal region. Two inches below the opening the invagination remains in the shape of a circular thickening of the bowel with a narrowing of its lumen to more than one-half of its normal size. A close inspection of the specimen shows that no gangrene has occurred, but that the intussusceptum has undergone atrophy. A stream of water passing along the ileum in a downward direction escapes through the invaginated portion and through the new opening, the stream from the latter being at least three times larger than the one through the intussusceptum. Excluded portion of ileum and colon empty and very much atrophied and contracted. Below the new opening the colon and rectum contain normal feces in considerable quantity.

Experiment 80.—Young cat. Ileo-cæcal invagination; length of intussusceptum four inches, and in order to prevent spontaneous disinvagination the bowel was fixed in its position by two fine catgut sutures. Ileo-colostomy below the lower end of the intussusceptum by lateral apposition and suturing. Animal died on the fourth day after operation. Abdominal wound united. Diffuse peritonitis from perforation at site of suturing. Length of intussusceptum reduced from four inches to two inches and a half. It was found impossible to effect reduction by traction on account of firm adhesions at neck of intussusciens. No gangrene.

Experiment 81.—Adult, large dog. Intestinal obstruction was produced by making two sharp flexions near the ileo-cæcal region by folding the bowel on its side and fixing it in this position by fine catgut sutures; the apices of the flexions were sutured together so as to render the obstruction more complete. Intestinal anastomosis was established by lateral apposition and suturing. Physical condition of dog remained good throughout; appetite and evacuations normal. Killed 31 days after operation. No peritonitis; a number of omental adhesions at point of operation. Flexions quite sharp, rendering the bowel nearly, if not completely, impermeable at this point. Perfect

union between bowels, with some thickening of their walls by inflammatory exudation. New opening oval in shape, an inch and a half in length, a few of the deep sutures still remaining attached to its margins. Excluded portion of bowel empty and somewhat atrophic.

Experiment 82.—Dog, weight 13 pounds. Obstruction of the bowels made by an acute flexion four inches above the ileo-cæcal region, retained by four catgut sutures. Intestinal anastomosis by an opening an inch and a half in length which brings into communication the ileum above the obstruction and the descending colon. The animal showed no untoward symptoms, and was killed 41 days after operation. A number of intestinal folds agglutinated by adhesions; no evidences of diffuse peritonitis. Where the flexion had been made the loop of intestine is connected by a broad band of adhesion which gives to the bowel a horse-shoe shaped appearance. Intestine below the seat of flexion contains a small amount of hardened fæces. Colon and cæcum above the new opening nearly empty and greatly contracted. Line of suturing somewhat thickened. New opening oval in outline and about an inch in length, surrounded by a corrugated elevation of mucous membrane. A stream of water passed through the bowel from above downward readily escapes through the new opening, while only a small stream can be forced through the flexion.

Experiment 83.—Dog, weight 27 pounds. A volvulus was made six inches above the ileo-cæcal region by rotating an empty loop of the intestine once around its axis and fixing it in this position by three catgut sutures. Intestinal anastomosis between the ileum above the volvulus and the descending colon by lateral apposition and suturing. For four days after the operation the evacuations from the bowels contained blood; after this time the stools were normal. Dog in excellent condition when killed, 31 days after operation. No signs of diffuse peritonitis. The portion of bowel which constitutes the volvulus adherent, contracted and empty. Water can be readily forced through this part of the bowel. Cæcum and colon above new opening empty and contracted. Size of new opening larger than the lumen of the ileum, its margins surrounded by a prominent ridge of mucous membrane to which a few of the deep sutures still remain attached. In this experiment nearly the entire colon was excluded, consequently the fæcal discharges were quite frequent and fluid or semi-fluid in consistence.

Experiment 84.—Dog, weight 17 pounds. Two inches of the ileum were invaginated into the cæcum. Ileo-colostomy by uniting the ileum with the transverse colon by suturing. The animal appeared quite ill after the operation and died on the fifth day after having manifested

well marked symptoms of perforative peritonitis. Abdominal wound not united. Only partial union between the intestines at point of junction. Diffuse septic peritonitis from perforation.

REMARKS.—In at least two experiments which are not here reported the animals died a few hours after operation of shock. In a number of other experiments the operation was followed by more or less shock, but the animals, without receiving any special treatment, rallied after 6 to 12 hours. The symptoms referable to the immediate effects of the operation were due to the length of time required in applying a double row of sutures in uniting the visceral wounds, a step in the operation which always required from 30 minutes to an hour. These experiments only corroborate the statement previously made that the excluded portion of the intestinal canal, including the obstruction, does not become the seat of fæcal accumulation, but undergoes atrophy after free intestinal anastomosis has been established between the intestine above and below the seat of obstruction. Experiments Nos. 68 and 69 furnish most striking proof that the danger of gangrene in cases of invagination is greatly diminished by establishing an early intestinal anastomosis, as when this is done the violent peristalsis is promptly arrested by furnishing a new outlet to the intestinal contents; at the same time the serious consequences resulting from pressure and distention above the obstruction are likewise promptly averted. In cases of intestinal anastomosis where nearly the entire colon has been excluded, the fluid contents of the small intestines reach the rectum at once, and cause frequent fluid fæcal discharges, an occurrence which does not appear to impair the general health of the animal. The new opening should be made of adequate size so that its lumen will at least correspond to the lumen of the bowel above the obstruction.

(c) ILEO-COLOSTOMY BY PERFORATED APPROXIMATION DISCS.

Experiment 85.—Dog, weight 20 pounds. The ileum was completely divided three inches above the ileo cæcal region, both ends closed by invagination and three stitches of the continued suture.

A communication was established between the proximal extremity and the colon, by making an incision into the ileum on convex side near the close end and introducing through this opening a perforated decalcified bone plate. A similar opening was made into the ascending colon opposite its mesenteric attachment through which a perforated plate of wood was introduced. To each plate were tied four catgut sutures. The lateral sutures were passed through the margins of the wound. After the plates and sutures were in place the wounds were brought in contact and the four sutures tied, which coaptated the serous surfaces of both bowels over an area corresponding to the size of the plates. The animal remained apparently well for two days, when symptoms of peritonitis set in and death occurred five days after operation. Diffuse peritonitis. Union at point of operation incomplete which resulted in a perforation. Discs had disappeared. As the catgut sutures were quite fine it is more than probable that partial separation of the plates occurred before adhesions had taken place between the serous surfaces of the coaptated bowels, which resulted in perforation and death from diffuse septic peritonitis.

Experiment 86.—Dog, weight 15 pounds. Invagination of colon into colon to the extent of two inches. Intestinal anastomosis by making an ileo-colostomy by lateral apposition of the ileum to colon below invagination, using perforated hard rubber plates which were tied together by four catgut sutures, the lateral sutures being passed through the margins of the wound. After tying the sutures it was found that at one point the margins of the wound showed a tendency to evert, consequently a fine catgut suture was passed through the peritoneum only and tied. The animal did not appear bright the day after the operation, but subsequently showed no signs of suffering; killed 24 days after operation. Abdominal wound firmly united. Omentum adherent to wound and at point of operation. The invagination was partially reduced. The bowel at this point was curved in the shape of a horse-shoe, but permeable to a stream of water. Excluded portion of colon tortuous and atrophic. Cæcum contained a small quantity of fluid fæces. Plates could not be found. New opening sufficiently large for free passage of intestinal contents.

Experiment 87.—Dog, weight 15 pounds. Ileum divided transversely 15 inches above the ileo-cæcal region; both ends closed in the usual manner. Ileum and colon approximated by decalcified perforated bone plates which were tied together by four catgut sutures, the lateral ones transfixing the margins of the wound. On the second day the evacuation from the bowels contained traces of blood. Animal killed

18 days after operation. Abdominal wound completely healed. Omentum adherent to wound. Numerous adhesions between the intestinal folds. Proximal blind end of ileum had been changed into a pouch-like form and contained a mass of hair and fragments of bone. One very sharp spiculum of bone had nearly perforated the intestine. New opening corresponds in size to the lumen of the ileum.

REMARKS.—The operations of lateral apposition of ileum to colon by perforated approximation discs, have shown that it is unsafe to rely upon catgut as a suturing material, as when fine catgut is used coaptation is not maintained for a sufficient length of time for adhesions to take place, and coarse catgut when tied interferes with accurate approximation, as the knots after tying mechanically separate the serous surfaces. It is advisable to use removable plates and to tie with silk. The results of ileo-colostomy made by approximation discs have not been as favorable as after jejunio-ileostomy or ileo-ileostomy, and in repeating the operation on man it would be indicated after bringing the intestines in apposition by tying the four sutures to apply a number of superficial sutures for the purpose of still further guarding against the escape of gas or fluid contents into the peritoneal cavity. The plates when properly fixed in their places and tied together with sufficient firmness not only coaptate an extensive area of serous surfaces, but they at the same time secure perfect rest for the parts which it is intended to unite, until firm adhesions have formed.

ILEO-RECTOSTOMY.

In cases of intestinal obstruction due to inoperable conditions low down in the colon it becomes necessary to establish an intestinal anastomosis between the ileum and the rectum, in order to avert the necessity of making an artificial anus, in other words, to make an ileo-rectostomy. The operation can be made in the same way as establishing a communication between the ileum and the colon by lateral implantation, by lateral apposition and double suturing or by lateral apposition by perforated decalcified bone plates. The operation is however more difficult because the rectum is not as accessible as the colon, and from the greater vascularity of the gut the in-

cision is more liable to give rise to troublesome hæmorrhage. While the slight hæmorrhage from an incision into the small intestines and the colon is usually promptly arrested by suturing or compression by the approximation discs, the bleeding from a wound of the upper portion of the rectum not infrequently requires the application of one or more catgut ligatures before it is safe to unite the wounds. During the operation traction must be made upon the rectum in an upward direction so as to lift the upper portion of the bowel out of the pelvis. In both of the experiments described below, the wounds were united by Czerny-Lembert sutures.

Experiment 88.—Dog, weight 90 pounds. Invagination of colon into colon for two inches and suturing of intussusceptum to neck of intussusciens by four fine silk sutures to prevent spontaneous disinvagination. Ileum incised in a parallel direction for an inch and a half on convex side and this wound united with a similar incision in the rectum on its anterior surface by a double row of sutures. For the purpose of immobilizing the sutured intestines an additional fine catgut suture was applied above and below the place of suturing, embracing only the peritoneal and muscular coats of the intestines. On the third, fourth, and fifth days the fæcal discharges contained blood and mucus. On the sixth day the abdominal wound partially opened, and a considerable quantity of sero-purulent fluid escaped. Death seven days after operation. Abdominal wound not united. Diffuse purulent peritonitis. Numerous intestinal adhesions. Invagination retained; adhesions between the intussusceptum and intussusciens; no gangrene; perforation at point of operation.

Experiment 89.—Cat, weight 7 pounds. Ileo-rectostomy by lateral implantation. The ileum was cut across transversely an inch above the ileo-cæcal valve, and the distal end closed by invagination, and three stitches of the continued suture. The proximal end was transplanted into a longitudinal incision on the anterior surface of the upper portion of the rectum by Czerny-Lembert suture. With the exception of an occasional slight rise in temperature no serious disturbances were observed during the progress of the case. The evacuation of the small intestines directly into the rectum appeared to increase the peristaltic action of the rectum as the fæcal discharges were fluid and frequent. Animal killed 20 days after operation. Abdominal wound completely united. No peritonitis. A few folds of the small intestines and the omentum adherent to the wound. Insertion of

ileum into rectum in an oblique direction ; union at point of junction complete throughout ; intestinal coats at this point somewhat thickened. Peritoneal surface smooth and continuous from one bowel to the other. New ileo-rectal opening corresponds in size to the lumen of the ileum ; margins of this opening consist of a ridge of mucous membrane to which a row of the deep sutures remain attached. Excluded portion of large intestine empty and contracted. Rectum contained a small quantity of fluid fæces.

[TO BE CONCLUDED.]

EDITORIAL ARTICLES.

THE SURGERY OF THE LARYNX.

It is quite natural, at the present time, when so conspicuous a personage as the Emperor Frederick of Germany, is suffering from a laryngeal trouble, possibly malignant in character, that medical literature, especially that of the German Empire, should be prolific in articles bearing on affections of the larynx. Schuchardt¹ begins a recent paper with the history of a successful case in which attempts at removal through the mouth by snaring had proven unavailing; in fact, the wire finally became so entangled in one of the large nodules of the fibroma that it could not even be withdrawn. By carefully dividing the larynx in the middle line, the growth was removed without serious remaining injury to the voice. Tracheotomy had been previously performed, and this alone for quite a time induced a diminution in the size of the growth.

He then takes up the advantages and disadvantages of removal of local growths by laryngotomy. The operation for foreign bodies dates from the last century, but for tumors only from this. Laryngoscopy has served to increase the number of these operations, though principally to enable removal by the mouth. The various authorities differ widely in their choice between the two methods, some almost discarding laryngo-fissure, whilst others hold the endolaryngeal method to be a sort of artistic possibility of little practical value. Schuchardt endeavors to point out the appropriate field for each. With the great majority of laryngeal tumors removal by the mouth should be the rule, but laryngotomy is proper when the case is unusual or complicated, or the neoplasm is malignant. In the latter case this is almost imperative as giving the only hope of complete and efficient removal.

¹External Laryngotomy and its Significance in the Treatment of Laryngeal Tumors. By Dr. K. Schuchardt, of Bonn. *Volkmann's Sammlung*, No. 302.

He follows the customary division of the so-called benign growths, into fibroma and papilloma. Epithelial cancer begins in various forms, like a papilloma, again as an ulcer. Infection of the glands occurs late, usually after ten or twelve months. Hoarseness is the earliest, most constant and lasting symptom.

Papillary tumors have undesirable clinical characteristics--rapid growth, inclination to form large obstructing masses, and great tendency to relapse. Moreover, the active epithelial proliferation is sometimes subject to unknown influences leading it to degenerate into carcinoma. This is naturally comparable to similar results of chronic inflammatory processes elsewhere. Hence, there is every reason for the thorough eradication of these growths also. With fibroma other considerations usually determine the choice of operation. Those favoring incision are :

1. Large size of the tumor.
2. Broad attachment and impossibility of bringing the attachment in sight.
3. Too great irritability of larynx and pharynx. As to size it has been proven that even those nearly or quite filling the laryngeal space may be removed through the mouth. Still, it does not follow that this tedious and trying method is then the better. Since the introduction of cocaine the third condition is of far less import than formerly.

Papilloma, especially when involving considerable of the larynx-lining, can evidently be treated more rapidly, thoroughly and effectually by thyrotomy. Later statistics do not prove unfavorable. Its dangers are very much reduced by the present improved methods, whilst intra-laryngeal operations even by the best laryngologists have repeatedly been attended by unpleasant accidents. It is, however, necessary to divide just in the middle line and avoid injuring a vocal cord.

For special cases such operations as partial and subhyoid laryngotomy may be permissible.

He next explains the details of the operation, without adding much that is new. If the cartilage is ossified, bone shears or a small saw are necessary. Hemorrhage is slight in fibroids, but may be considerable in vascular papillary growths. This may necessitate tamponing

the laryngeal cavity with iodoform gauze. If a string is attached and passed out through the mouth the plug on loosening (usually within a week) can be removed in this way. Preceding tracheotomy is advisable where hemorrhage from the inner wound surface is feared. Especially in children and also where there is ossification, it is necessary to pass catgut sutures through cartilage and perichondrium. Necrosis does not follow unless from wound accidents. In very slight cases where bleeding is not to be feared, the skin can be sewed up immediately. When all the precautions have been successful, the voice soon recovers its clearness.

The causes of laryngeal tumors are briefly treated; though, of course, in many cases no cause can be found.

Males are far more disposed, as also those who severely tax the voice. Chronic inflammations, irritants, etc., play a frequent part. A single severe strain of the vocal apparatus has seemed to suffice in a few cases. In childhood papillary growths, like adenoid vegetations of the nose, occur more frequently in the scrofulous and hereditarily tubercular, whilst in a few cases they have seemed to be tubercular.

WILLIAM BROWNING.

MATERIAL ORGANIZATION OF THE SURGICAL CLINIC AT PARIS.

Professor LeFort has just delivered an address on this subject which, although of mainly local interest, yet raises some points of general and great importance.¹ For instance, it chiefly concerns Parisian, or rather French, students to know that the operating theatre at the hospital "Necker" is lighted only from one side, and *that* the side opposite to the benches for students and spectators, so that the operator has his choice between placing the patient in such a position that he can see while the spectators cannot, and placing the patient in such a position that neither the operator nor the spectators can see. But a question which concerns surgeons throughout the world is this: Is it now justifiable to treat abdominal cases as if the patients were not only deserving all the care and forethought and material expenditure which

¹*LeBulletin Medical*, Nov., 1887.

belong of right to all sorts and conditions of the grievously ill, but also as if they deserved something more. For example, is it just that an ordinary case of ovariectomy should be operated on in a special theatre with special arrangements, including the non-admittance of spectators, while an exarticulation at the hip or a double amputation of the thigh would be denied any such privileges, although each is a far more dangerous procedure? This is a kind of question which many a surgeon besides Professor LeFort has asked himself? Only three weeks ago the writer, being about, after a preliminary tracheotomy, to excise a cancer of the larynx, wished for a separate room in which to protect his patient as far as possible from the cold and fogs of November in London, and could not get one, although the ovariectomist at the same hospital has always one of right. Analogous inconsistencies are of daily occurrence. At the hospital "Necker," while the "ordinary" cases have to be operated on in a theatre which, in construction and situation relatively to the wards from whence the patients come could scarcely be paralleled in its unfitness, the abdominal cases, comparatively few in number, have an admirably planned and located theatre for their own exclusive use. The latter class are, by the administration of the hospital, termed "grandes operations." "Although," says Professor LeFort, "I have been for twelve years teacher of operations and practical surgery in the Faculty of Medicine, I confess myself still ignorant of what ought to be understood by 'grandes operations.' Must the term be confined to operations down on the abdomen, such as ovariectomy, hysterectomy, nephrectomy, etc.? * * * If, on the contrary, and I am of this opinion, the name of "grandes operations" should be given to all those which seriously imperil the patient's life, we have a different matter to deal with."

"All sick persons have a right to equal protection, equal care. Once we admit that our new theatre (for abdominal cases) insures better results to our operations, I do not see what theory can justify a denial of its advantages to a case of strangulated hernia or of amputation. I do not see on what new principles of humanity, chances of cure can be refused to a sick man because the serious operation he is about to

undergo has been practised for centuries, while they are given to those who, incurring dangers perhaps less serious, have, it is true, the advantage of exciting a sentiment more lively than that of compassion, namely curiosity, because the operation performed on them has been more recently introduced into practice.”

C. B. KEETLEY.

INDEX OF SURGICAL PROGRESS.

HEAD AND NECK.

I. On Evisceration of the Eyeball, and Introduction of an Artificial Vitreous. By R. BRUDNELL CARTER, F.R.C.S. (London). Mr. Carter has emptied the eyeball and inserted a glass globe in 13 cases—in two eyes for intraocular tumor, one for chronic glaucoma, in four which had been destored by chronic inflammation, in five which had sustained injury, and one disorganized by acute inflammation. In the earlier operations, Dr. Mules' instructions were followed precisely. There were several failures of union partial or complete, but since adopting, at Dr. Mules' suggestion, the use of silk sutures, there was perfect union in every case but one. In the first 11 cases there was some swelling and pain, but this was remedied in the last 2 by using Dr. Mules' method of sub-conjunctival drainage by a strand of twisted horsehairs.

Mr. Carter's present procedure is as follows : The conjunctival sac is washed out with a 20% solution of Barff's boroglyceride, the lids widely separated by the speculum, the cornea fixed at the centre. cut all round the margin by a cataract knife, and wholly lifted off. The eyeball is then emptied, and the inner surface of the sclera scraped with a Volkmann's spoon, removing every trace of choroid and ciliary body by a small sponge on a handle. Bleeding is checked by packing the cavity with a sponge soaked in boroglyceride solution, and while the sponge is in position the circular wound is converted into an ellipse by making two horizontal scissor cuts, and cutting off the angles on either side. When the sponge is removed, the cavity should be clean and white, it is syringed out with boroglyceride, and a glass ball of such size that the edges of the wound will easily meet over it, is taken out of the boroglyceride solution and placed within the cavity. The open-

ing is then united by stout silk sutures, which have been soaked in a solution of salicylic acid, 1 part, glycerine 1 part, alcohol 9 parts. The needles being passed through the scleral and conjunctival tissues at a good distance from the margins. Three sutures are generally sufficient, and when the edges of the wound are in perfect apposition a scissor cut is made through the conjunctiva below the wound, the scissors burrowed back beyond the equator between the conjunctiva and sclera, and a drain composed of horsehairs inserted. A hypodermic injection of morphine is given before recovery from the anæsthetic, (chloroform being generally preferred to ether on account of its producing a smaller tendency to bleed), and after a final washing with boro-glyceride solution, the eyelids are covered with linen smeared with sanitas jelly, and over this an aseptic pad. If there be much subsequent swelling of the conjunctiva, the protruding part is painted with cocaine and freely punctured. The sutures are removed in a week or 10 days, by which time union is usually complete.

Mr. Carter then gives the details of the 13 cases. Even in the few cases which were to some extent unsuccessful, the results were infinitely superior to any which could have been gained by enucleation. There is no apparent difference between the mobility or position of the two eyes, the lachrymal puncta are kept in proper contact with the artificial eye, and the patient is, generally speaking, unconscious of the presence of the latter. Two of the cases encourage the adoption of the method in all intraocular tumors which are not gliomata—for in some of the latter the disease may have penetrated backward into the nerve. In the case of sarcomata, however, this is no excuse for enucleation. The tendency to recurrence is in distant parts and not in the orbit, and the uveal tissue, in which the tumor is seated lies in structural connection with tissue passing out of the eyeball.

Mr. Carter then discusses various objections which have been made to Mules' operation. The unfounded fear of sympathetic ophthalmitis, or of the artificial vitreous being a source of danger, that the greater mobility of the stump will be only temporary, etc. In the first case the glass ball has been tolerated for 19 months, the patient being unconscious of its presence, and in no instance has it produced the smallest

uneasiness or irritation, when once healing is complete, although if partially exposed it is apt to cause pain. Mr. Carter's experience leads him to think that we are indebted to Dr. Mules for one of the most remarkable and valuable improvements in ophthalmic surgery. Most of the objections which could at first be urged against it have been already removed by experience, and it is the duty of surgeons to endeavor to remove any others which may remain, and not to deprive the patient of the great benefits as regards both comfort and appearance, which the principle is calculated to confer.—*Medical Press and Circular*, Aug. 17, 1887.

P. S. ABRAHAM (London).

II. Trepanation of Mastoid Process, complicated by Perforation of the Transverse Sinus By DR. R. VON BARACZ, (Lemberg). He operated with the hollow chisel. After removal of the granulations, whilst smoothing the outer plate there was a rush of dark blood showing a marked periodicity of flow. The accident occurred despite observation of the rules laid down by Schwartze. He tamponed with 50 % iodoform gauze.

He has collected 5 other cases. By adding that of Benton (*Proc. King's County Med. Soc.*, p. 260, Jan. 1884,) who was, however, trephining for another purpose, we have a total of 7 fairly certain cases. None terminated fatally although in one (Guye's) air entered.—*Wien. Med. Woch.*, 1887, Nos. 38-39.

WM. BROWNING (Brooklyn).

III. Phosphorous Necrosis of the Jaw. By DR. ED. ROSE, (Berlin). The interesting studies included in this paper are concerned with the behavior of the operator in those cases of necrosis of the jaw resulting from phosphorus poisoning or acute osteomyelitis.

Conservative surgery has directed itself here very pointedly to the preservation of the teeth in those cases demanding resection. Beginning with a review of 12 cases of phosphorus necrosis of the upper and lower jaw, the author, by a very careful comparison of results and post-mortem specimens, concludes in favor of the "tertiary subosteo-

phytic resection" of the affected jaw. The secondary subperiosteal operation in spite of all care to preserve the periosteum intact, only results in an incomplete restoration of bony parts. Again, in all cases we must wait for the complete separation of the living from the dead bone before proceeding to the removal of sequestra. In future cases in order best to preserve the teeth, the incisions made in the mucous membrane of the mouth may be avoided. An external incision along the posterior inferior border of the lower jaw is substituted. The teeth are left *in situ*, sequestra are rather lifted away from the teeth both in the upper and lower jaws. The teeth, however loose, should not tempt the operator to their extraction.

In an interesting case of osteomyelitis mandibulæ idiopathica with total necrosis, the whole body of the lower jaw was removed by a subosteophytic necrothectomy. An incision 8 cm. long was made externally along the inferior edge of the jaw, the periosteum being raised, the new formed bone was chiseled through and the large total sequestrum removed inferiorly. The mucous membrane of the mouth being preserved intact. Here the teeth were left hanging loosely in the gums, and moving backward and forward at every movement of the patient. Some of the teeth after 6 months became somewhat more fixed, though even after 3 years the roots could be still felt with a probe freely exposed in the jaw. These teeth were retained living for 3 years eventually becoming fixed without receiving any blood supply through the root pulp in the normal way, but were nourished through the surrounding plexus in the dental mucous membrane. Thus the nourishment is so spare that teeth may be deprived of it through one avenue (the root and pulp) and still by absorption of lymph through the mucous membrane at the neck of the tooth maintain their vitality for years.

Incisions in the mucous membrane are to be avoided and the removal of sequestra through the incisions externally in the skin preferred.

The author, in addition to the above, records a case of complete cystic dilatation of the medullary canal of the lower jaw, the body of the jaw being much increased in size and hollowed out in its interior. The marrow tissue was replaced by a thin serous fluid tinged with blood,

(hydrops cysticus mandibulæ). The patient was a girl 13 years of age. Three members of the same family have suffered from disease of the jaw of a similar nature, (osteomatosis hereditaria mandibulæ). In this case the roots of the teeth must have been exposed free in the dilated cavity in the body of the jaw bathed in the above fluid—another instance, in the opinion of the author, of the nourishment of the teeth through channels other than the root pulp.—*Zeitschr. f. Chir.*, bd. xxv., heft. 3.

IV. Bardeleben's Goitre Extirpations. By Dr. A. KOHLER. Twenty-four operations for the extirpation of goitre performed since 1876. Of these 15 operations were total and 9 partial extirpations. Of the total 5 proved lethal. One carcinoma, one sarcoma, both with metastases. Two with marked changes in the respiratory passages which rendered tracheotomy necessary. In cases where tracheotomy was resorted to it was performed only as a dernier ressort and exerted an ill influence on the course of the operation. The cases, of course, were in other respects unfavorable. Extirpation was begun with the vertical incision to which one or two oblique incisions were added, in order to expose the anomalous structures of the thyroid and vessels. The recurrens n. was in all cases avoided when the thyroid inf. was isolated. Irrigation with salicylic-boric acid solution or one-half pro mille sublimate. Drains were not wholly dispensed with. The drain opening closed slowly, the remainder of the wound (when tracheotomy was not performed) healed by primary union. As in all the cases of total extirpation there was a total degeneration (colloid sarcomatous, hyperplastic) of the organ, single nodules were not extirpated or such procedure thought of. In cases of total extirpation under observation for two years no cachexia strumipriva has shown itself. The fear of the latter sequela will, in the future, deter *perhaps* from total strumectomy on cosmetic grounds, and the partial extirpation with injections, etc., will be substituted in these cases. In 10 of the author's compiled cases all have been under observation for periods varying from 1 to 4 years, and in no cases have symptoms of cachexia or myxœdema appeared. Spontaneous myxœdema is almost an unknown dis-

ease in Germany.—*Deutsch Zeitschr. f. Chir.*, bd. 26, heft 1 and 2.

HENRY KOPLIK (New York).

V. A Permanent Tube for the Œsophagus. By Dr. R. GERSUNG (Vienna). The leading idea is not advanced as a new one. His plan is to use such a tube as will keep the passage open—in cases of cancerous or cicatricial narrowing—and at the same time allow the patient to swallow through it. The chief interest lies in the way he seeks to accomplish this. He used soft rubber tubing, in one case a Nelaton catheter. It opens above at the upper end of the œsophagus; from this point up the tube is cut away so as to leave but a narrow strip of rubber on each side. Each strip is drawn out through the respective nostril and the two are tied in front of the nasal septum. To prevent regurgitation he cuts a wedge-shaped piece from each side of the lower end of the tube. The two projecting tips thus left separate to allow material to pass into the stomach, but close together like a valve when there is any tendency for it to return.

He has tried this method in two cases and is encouraged to recommend its further trial. In a 7-year old boy, beginning 6 days after accidental drinking of caustic potash, he used a Nelaton 10 days and a double tube 11 days. His second case was after œsophagotomy for cancer at the upper end of the organ. Here it was kept in 5 weeks, including repeated changing. For a time he used a ∞ -shaped tube made by slitting two tubes lengthwise and sewing their edges together. — *Wien. Med. Woch.*, 1887, No. 43.

WM. BROWNING (Brooklyn).

VI. Case of Lymphangioma Colli Cysticum. Extirpation. Cure. Prof. Hofmokl (Vienna). This case is the counterpart of a similar one of hygrom. colli congenitum recently published by Prof. Wölfler (*Med. Presse*, No. 28, 1886). Female, æt. 16. Had three years previous to operation noticed a small elastic swelling behind the right sterno-mastoid above the clavicle. This grew to a size which at extirpation equalled that of an apple. It was elastic and showed fluctuation. On exploratory puncture the cyst gave a light, yellow fluid containing cholesterine, fat and lymph cells. It was extirpated

easily, but the walls were so thin that the cyst burst during operation. It was then freely incised and easily separated from the surrounding structures. The interior was lined with endothelium and the contained fluid was no doubt degenerated lymph. Bleeding was insignificant; the wound was sutured; a drain inserted and sublimate bandage applied. Primary union and cure in 10 days.—*Arch. f. Kinderheilkunde*, band viii, heft iv.

VII. Intralaryngeal and Intratracheal Thyroideal Tumors.
By Dr. A. HEISE (Tübingen). Three cases of new growths composed of strumous thyroid glandular tissue occurring within the interior of the larynx and trachea have been recorded in the Tübingen clinic since 1874. Ziemssen was perhaps the first to describe these tumors. He records, in 1875, a case occurring in a shoemaker 30 years old. This tumor was situated so as to compress the posterior wall of the trachea. The origin or histogenesis of these tumors is an interesting study. In the cases recorded in the Tübingen clinic the tumors were isolated from the thyroid gland, they caused no ulcer of the trachea; the mucous membrane was intact over their surface; they protruded into the lumen of the larynx or trachea, causing dyspnoea. The thyroid proper was little or not at all enlarged. These cases are, from a clinical standpoint, intralaryngeal or intratracheal struma. But it is to be also remarked that these growths cannot be classed among the malignant or benign growths of the thyroid projecting or compressing the larynx or trachea. They are rather accessory thyroid glands developing from an anomalous disposition of some embryonal thyroid tissue in foetal life. The tumor was situated in the 3 cases of Bruns on the posterior wall of the larynx and trachea. This situation is avoided by most other tumors of the larynx as the papillomata. The tumors are not connected in any way with the cords.

In all four recorded cases the tumors were subglottic. In the cases of Bruns the growths extended from the glottis to the extent of two to four tracheal rings. In Ziemssen's case the tumor began in the middle of the cricoid cartilage, extending downward for 2 cm. The above situation is a constant one. The surface of the tumors is smooth. In one case of Bruns the thyroid gland, though little enlarged, showed

slight strumous changes. The tumors had a characteristic cylindrical form with broad base. The dyspnœa was a gradually increasing one. The differential diagnosis concerns only benign growths situated below the glottis. There are infrequently papillomata or fibromata. The former are cauliflower in appearance and often multiple; the latter are small and sessile.

Adenomata have only been observed twice, and in both cases multiple. Enchondromata are somewhat more frequent. In all of the cases of Bruns the tumors were removed by extralaryngeal interference (tracheotomy). The intralaryngeal methods are useless here. The dangers are hemorrhage into the trachea. This may be obviated by the Trendelenburg tamponade. In incomplete narcosis the manipulation of the mucous membrane causes a disagreeable tendency to cough. This may be obviated by painting the surface of the trachea with a 2% solution of cocaine. The galvano-caustic apparatus was used in two cases, the scissors in one. In all cases the recovery was most satisfactory and complete.—*Beitrage zur klin. Chir. von P. Bruns, Tuebingen*, 1887.

H. KOPLIK (New York).

EXTREMITIES.

I. The Peroneal Type of Progressive Muscular Atrophy.

By HOWARD H. TOOTH, M.D. (London). Under this heading, the author examines those cases of progressive muscular atrophy which commence in the lower extremities of children (not infants) and adolescents, and which frequently cause talipes varus or even valgus to appear at that period of life. Hence, its surgical importance. His acquaintance with the literature of the subject is evidently very extensive, and there is appended an admirable bibliography. The conclusions arrived at are as follows:

1. There is a form of progressive muscular atrophy, which commences in the lower extremities, most often in the peroneal muscles, but sometimes also in the tibialis anticus, extensor longus digitorum, or gastrocnemius.

2. The hand and forearm muscles are (apt to be) attacked at an early period.
3. The disease is one of childhood.
4. Heredity is a marked feature.
5. The disease shows a slight preference for the male sex.
6. Fibrillar or fascicular tremors are frequently, but not always, present.
7. Degenerative electrical changes are often an early phenomenon.
8. From the records of autopsies, as well as from the symptomatology, it may be inferred that the disease is an affection of the *peripheral nerves*.

A table of 20 recorded cases is given. This number will strike many readers as a small one, considering that the disease is not rare. But, until recently, neither pathologists nor clinicians have paid much attention to it. *Thesis for the degree of M.D. London: H. K. Lewis, 1886.*

C. B. KEETLEY (London).

II. Osteoplastic Amputation of the Thigh According to Gritti. By Dr. E. RIED (Munich). The author discusses the value of Gritti's amputation, and attempts a finding of the proper indication for its application. Ten cases operated upon, according to the modification by the older Ried of Gritti's operation, in the Jena clinic, 1865-1884, are also reported. The originator of the operation intended to bring the cicatrix of the stump outside the point where it would be subjected to pressure, to shape the bottom of the stump of a tissue accustomed to pressure, and finally to eliminate the subsequent conicity of the stump after the healing processes were completed. The modification of Ried is as follows: The extremity is held in the extended position. The anterior flap is formed by an incision passing from the middle of the external condyle of the femur (on the right side) or the internal condyle (on the left) to within 2 or 3 finger breadths below the border of the patella; the incision is carried from the other condyle downward and forward, meeting the first at the tuberosity of the tibia. The skin is retracted and the ligaments divided.

The crucial ligaments are left intact. The femur is divided at the upper limit of the patella. The posterior flap is now formed of skin and connective tissue; the rest of the structure being divided as high as the situation of the point of division of the femur. The arteries were tied. The patella then is freed from fat and connective tissue and the articular surface of the bone sawn off. The two flaps are apposed by means of one deep silver wire suture and several superficial catgut and silk sutures; closing with drainage, antiseptic dressing and higher position of the stump. The apposition of sawn surfaces of the patella and femur is a loose one. The quadriceps is given some room for shortening, without displacement of the patella. The exact apposition of patella and femur can be established after a few days, if the stump has been kept at perfect rest. In pre-antiseptic days the mortality resulting in cases operated upon by Gritti's method did not encourage its success. Antisepsis may change this entirely. On the battle field this operation even in the hands of a skilled surgeon demands time, and the chances of displacement of the patella through transportation should be considered. The cases in which it is indicated are those where there is plenty of preservation of skin for the anterior flap. It is indicated where in ulcers of the foot the extensive changes in the skin bar out an amputation in the leg; in faulty union or imperfect healing of fracture of the leg in its upper third; in recent complicated fractures of the leg where there is no extensive laceration of tissues above the knee; in tumors of the upper third of the leg; in extended necrosis of the tibia which excludes amputation in the course of the leg; in gunshot wounds as high as the tuberosity of the tibia. It is excluded where the shot has involved in any way the knee joint. The mortality in Ried's ten cases is 30%. In 144 cases collected by Salzmann from all sources the mortality reaches 48%. In Ried's cases three were performed in preantiseptic days with two deaths. Perfect cure and union of the patella resulted on an average in 48 days. (Salzmann 99 days). As to age Ried's cases ranged from the 19th to the 66th year of life.—*Deutsche Zeitsch. f. Chir.*, bd. 25, heft 3.

III. Wladimiroff-Mikulicz Osteoplastic Resection of the Foot. By W. B. HOPKINS, M. D. (Philadelphia). The author reports a case of this operation already referred to in the *ANNALS OF SURGERY*, vol. iii, p. 425, and vol. v, pp. 161 and 553, and making the twenty-second recorded case. A man, æt. 37, suffering from persistent traumatic ulcer of the heel was the subject of the operation. The author modified the operation: (1). By employing two sterilized bone dowels, one end of which was inserted into a hole in the lower extremity of the tibia and the other pressed downward into the tarsus, thus firmly fixing the tarsal bones to the tibia. (2). The divided and re-trenched ends of the peroneus longus, and the divided end of the tendo Achillis and the plantar fascia were severally brought together and sutured with catgut. A lighter suture united the ends of the re-trenched posterior tibial nerve. The former doubtless greatly promotes early union by providing perfect fixation, while the latter has without doubt added to the function of the foot. The result of the operation was perfectly satisfactory, the patient, after eight months, being able to walk four miles with cane and boot; has limited motion under voluntary control in flexion as well as extension, while the lengthening is only three quarters of an inch.—*Med. News*, Dec. 3, 2887.

JAMES E. PILCHER (U. S. Army).

IV. The Synovial Sacs and Tendon Sheaths of the Palm. By DR. A. VON ROSTHORN, (Vienna). This is essentially an anatomical study, though made with special reference to matters of practice. Previous works are reviewed, French descriptions meeting with most praise. The article is accompanied by colored plates, and a bibliography. Injections (principally of Teichmann's material), and anatomical preparation represent the methods employed. His aim was to establish, (a) the normal relations, and from these to formulate the general type, (b) whether there exists a free communication between the tendon sheaths of the thumb and little finger with the corresponding carpal sacs, (c), the kind of communication (d), the relation of superficial to deep flexors with regard to their enveloping synovial membranes, and also to their unclearly described so-called mesotendinea

(e), the numerous variations, their frequency and character, (f), standard illustrations.

The various details as to methods and particular cases must be read in the original.

The results he sums up under the following heads.

1. The mass of flexor tendons passing the wrist are united in a paquet by loose tissue, and further held together by a kind of smooth sheath of connective tissue.

2. Beneath the transverse carpal ligament are two synovial sacs separated by a sheath. These extend proximally and distally beyond the limits of the ligament.

3. They may suitably be termed radial and ulnar sacs. The former only has relations to the tendon of the flexor of the thumb, the latter only to the tendons of the fourth and fifth finger. The flexor tendons of the second and third fingers are outside of both sacs.

4. The so-called mesotendina or mesotena of the separate tendons are very regular in occurrence, position and form, but vary as to dimensions. They bear vessels for the tendons. The so-called pockets of the synovial sacs are but culs de sac, arising from taut mesotendinous membrane.

5. Originally, in the new-born, all 5 fingers possess separate phalangeal synovial sacs not in any way communicating with the carpal sacs. In early childhood those of the thumb and little fingers gradually extend to the carpal sheaths and finally—as is the rule in adults—communicate.

6. Communications in adults;

(a). The ulnar tip of the ulnar synovial sac (of palm) with the synovial sheath of the little finger, Exceptionally it ends blind.

(b). The radial synovial of the palm regularly with the synovial sheath of the thumb.

7. The middle three fingers possess each its completely closed phalangeal synovial sheath; though it is possible that occasionally the fourth may communicate with the tip of the ulnar sac.

8. The tendons of the common superficial flexors present a variable relation.

(a). Those of second and third fingers lie quite exterior to the carpal sacs. Only in isolated cases do they have an independent genuine synovial sheath, most frequently the index.

(b). The superficial flexors of the fourth and fifth fingers enter the ulnar carpal sac, and are supplied by its prolongation. Once he achieved a separate injection of the sheaths.

6. Instead of 2 carpal sacs, occasionally there are 3. Of these latter cases he makes two subdivision ;

(a). Most frequently the 2 carpal sacs are somewhat shortened, and the dividing septum separates toward the forearm to include the third wedge shaped sac.

(b). Less often both typical sacs are greatly reduced. Instead a large third sac extends far distally, through this runs the deep flexor of the index. These variations are usually found in the hands of elderly laborers. In women and youth he only found the usual number. Of 20 hands, 11 showed the normal type, 9 form *a*, and 3 form *b*.

10. The communication between radial and ulnar carpal sacs, recorded in one case by Gosselin, he has never observed, neither any between carpal synovial sacs and joints.—*Arch. f. kl. Chirg.* bd. 34. hft. iv, 1887.

WM. BROWNING (Brooklyn).

V. The Treatment of Felon Without Incision. By L. DUNCAN BULKLEY, M.D. (New York). Believing that subjects are commonly in a state of lowered vitality, often with a sluggish condition of the digestive organs, the author begins with a mild cathartic, and administers a tonic, preferably the following :

R	Magnesii sulphatis,	-	-	-	℥j
	Ferri sulphatis,	-	-	-	℥j
	Acidi sulphurici dil.,	-	-	-	℥iv
	Syrupi zingiberis,	-	-	-	℥j
	Aquæ q. s. ad,	-	-	-	℥iv

M. Sig. Teaspoonful in water, through a tube, after eating

In addition to this a gelatine coated pill of one-fourth grain of sulphide of calcium is administered every two hours. Careful attention is given to the diet.

Locally, he uses the diachylon ointment of Hebra as follows :

R	Olei olivarum optimi,	-	-	-	-	℥ ^{xv}
	Plumbi oxidi,	-	-	-	-	℥ij, ℥vj
	Olei lavanduli,	-	-	-	-	℥ij

M. Add the oil to two pounds of water and heat it with constant stirring ; the litharge is to be slowly sifted in, while it is well stirred in, fresh water being added as required. The ointment is to be stirred until cold, and the oil of lavender then added. In winter a slightly larger quantity of oil is required to make a soft ointment.

Spread the ointment upon the wooly side of lint, very thickly—even a quarter of an inch—and completely envelop the end of the finger ; generally, it is best to renew it twice a day and, if there is no discharge fresh ointment may be spread upon the same dressing. The affected part should not be washed, nor the ointment scraped off. Suppuration commonly takes place, but it either breaks forth itself or may be evacuated from under the epidermis by a little prick. The pain is almost entirely allayed and the inflammation greatly diminished.—*Jour. Am. Med. Assn.*, July 30, 1887.

GENITO-URINARY ORGANS.

I. Horny Growths of the Penis. By JOHN H. BRINTON M.D. (Philadelphia) and J. F. BALDWIN, M.D. (Columbus, O.). The first paper precedes a review of all the reported cases, which the writer could collect, by a report of a horn one and seven-eighths inches long and one and three-eighths inches in circumference at its base, which sprang from the base of the glans penis of a man æt. 62 and had existed for four years. A plate of horny tissue, varying in width from three-quarters of an inch to an inch, encircled the end of the glans, covering and destroying the frenum and its attachment, surrounding the meatus and narrowing it to a pin's point ; through this narrow opening, impervious to any instrument, the urine escaped slowly drop by drop. The glans was amputated and microscopical examination of the growth showed it to be horny in character. The second paper quotes one additional recorded case and reports one new one which occurred in a boy, æt. 19, upon whose glans a horn an inch long

had developed; this horn was removed, but recurred and nine months later was again removed and the site thoroughly cauterized with nitrate of silver, which obviated further reappearance. In both cases the growth first appeared as a soft wart.—*Med. News*, Aug. 6, 1887 and Oct. 15, 1887.

JAMES E. PILCHER (U. S. Army).

II. Melanosarcoma of the Penis. By Dr. GEORG FISCHER (Hannover). The author records a very rare case of melano-sarcoma of the penis (primary) occurring in a laborer 53 years old. The patient never suffered from venereal disease. The growth began as a small, dark blue, isolated spot on the left side of the glans penis 9 months before Dr. Fischer saw the patient. Then there was distortion of the stream of urine, the spots enlarged, and glandular swellings appeared in the inguinal region. Penis when seen by author was slightly curved upward in its anterior portion—there was paraphimosis. Glans and prepuce indurated on the glans penis above and below as far as the center of the organ dark blue discolorations of varying size. Around the urethral opening and under surface of the penis there were small nodules the size of a pea projecting from the surface; no ulceration except at the meatus the mucous membrane was eroded and bled easily on pressure. Large inguinal glands in both groins, the size of a hen's egg. Urine dark, but no pigment present. Amputation by circular method with knife 3 cm. from symphysis. Extirpation of inguinal glands. The right vena cruralis and left saphena magna on account of their connection with glandular growths were wounded, but after easily ligated. Patient seven months subsequent to above developed a recurrence of growth in the pelvis.

Examination of the penis by Prof. Orth showed the urethra to have been the seat of a growth black in color and involving all the tissues of the urethra in their whole circumference at its anterior portion being found in scattered patches in the posterior part of the urethra. The above nodules also were all sarcomatous in nature. The cells were round, spindle, star-shaped, containing pigment, but the number of cells free from pigment was greater than that containing pigment. The fact that the urine contained no pigment may be attributed to the

condition of the renal organs as the kidneys were not yet involved in the growth.

Only four cases of melanosarcoma of the penis are recorded, being twice metastatic and as many times primary. Of sarcoma we have 8 cases (Kaufmann). In two cases the urethral mucous membrane is supposed to be the primary seat of origin of the melanosis and the starting point of the growth (Holmes). Strictly speaking, in these cases there was primary melanosarcoma of the urethra. In melanosarcoma, dark, bluish-black, hard nodules of a few millimeters in diameter are found scattered on the penis, on the meatus, on and underneath the glans, the prepuce, and the rest of the organ. These nodules may be above the level of the skin. On the dorsum penis the hard cord of lymph vessels is felt. Hemorrhages from the urethra and distortion of the stream of urine are notable symptoms. Pains may be entirely absent. The prognosis is bad. Metastases and marasmus end the history of these cases. Melano-carcinomata are of doubtful occurrence in the penis. It is, if it occurs, of greatest rarity. —*Zeitsch. f. Chir.*, bd. 25, heft 45.

HENRY KOPLIK (New York).

III. Gonorrhœa Healed by Injections of Oil of Iodoform. M. PAUL THIÉRY (Paris). A series of examinations have shown that the numbers of gonococci found in the pus vary greatly in the different stages of gonorrhœa. Very few are found during the first few days. But about the eighth or ninth day they are found in very great quantities. Then they begin to diminish, and when only a gleet remains it is difficult to say whether any are to be found or not. We therefore see how necessary it is, when an antiseptic treatment is resorted to, to bring the whole force of the treatment to bear against the disease at the proper moment. This moment is about the third or fourth day, just before the germs have a chance of getting a firm hold of the membrane of the urethra. Several of M. Humbert's cases treated at the Hopital du Midi are reported, and they point out how much more successful the treatment is when it has been begun early. Frequent injections are given, and they consist of iodoform which has been thoroughly rubbed down in oil of sweet almonds. To insure

thoroughness, the surgeon gives the injections himself, 8 grammes, or one-third ounce, of the liquid being used at a time, and the patient being made to retain it in the urethra about 20 minutes. The advantage of iodoform over the perchloride is that it does not coagulate the albuminoids and thus form a coating which is impervious to microbes, but which soon vanishes. Besides, it has a decidedly soothing effect on the urethra. The great recommendation of this treatment is the short duration of the cases where it has been employed.

Amelioration has begun on the third or fourth day, and cure has been obtained in about an average of 13 days, which looks well when compared to the month which gonorrhœa generally lasts under a treatment by astringents. The difficulty is, of course, to get the patients to put themselves under treatment early enough, or before there is a profuse discharge.—*Le Progrès Médical*, March 5, 1887.

LEONARD MARK (London).

IV. On the After-treatment of External Urethrotomy.
By Dr. P. GUETERBOCK (Berlin). This article is complementary to a previous one in Vol. 16 of the same journal. It only takes up the subject with regard to cases where there is progressive infiltration of urine. He disclaims the opinion that the operation is indicated in all forms of urine-infiltration from stricture. This depends less on the seat of the rupture than on the extent and degree of the infiltration. The measures to be taken in such cases fall into three categories:

1. The operative treatment of the urinary infiltration.
2. The dilatation of the stricture.
3. Wound therapeutics in the narrower sense.

The second category drops out of consideration here. Cases are relatively rare where, besides measures against the infiltration, division of the stricture is indicated. He takes up only the cases of moderate infiltration with relative stricture. Here it is imperative to cut down in the median line to the lower urethral wall behind the stricture, thus establishing a direct passage to the bladder. Further incisions of infiltrated parts may be necessary. A canula or tube should pass through the median opening quite into the bladder. This should be of good size to give free exit to the frequently decomposed urine.

How long to continue such direct discharge depends on the condition of the wound, the separation of infiltrated and necrotic tissue; also on whether the patient can have trustworthy care. One of the tasks of the surgeon is the treatment proper of the infiltrated spots and the median wound. Statistics here are too much affected by complicating diseases to be reliable. That one-third the fatality after external urethrotomy is caused by the urinary infiltration is, he thinks, rather an underestimate. Pyæmia is perhaps the most frequent complication. After unfortunate experiences he tried and now strongly recommends permanent, that is, prolonged irrigation with very dilute lukewarm sublimate solution. The parts to be irrigated he now first covers with absorbent gauze, then with jute. Apposed surfaces, as in the bend of joints, are covered with a thick layer of flowers of zinc. Position of the patient is important. All pieces of dressing in direct contact with the wound. it is well to change once a day. In his cases for infiltration of perineum, scrotum and root of the penis, where such irrigation was done from the sixth to the thirteenth days, first day and night, then with nocturnal intermissions, a good granulating wound and re-enclosed testicle admitted a dry dressing by the thirteenth day. Perhaps in well arranged hospitals permanent sitz baths might be substituted for the prescribed irrigation.—*Arch. f. kl. Chir.*, 1887, bd. 34, hft. iv.

WM. BROWNING (Brooklyn).

V. The Present Status of the Inquiry into the Functions of the Bladder. By FRITZ BORN (Niederbiff). In this extended paper the author concludes that in the cadaver the closure of the bladder is effected by the sphincter vesicæ internus, which forms a firm support to the folds of mucous membrane to be found at the ostium vesicæ. The posterior of these folds, which are approximated to each other, is of considerable size and in older subjects contains besides mucous membrane prostate tissue. A further closure of the bladder is found not infrequently in the pars membranacea. In women (nullipara) this closure of the bladder is much less firm. If the bladder has been emptied before death the

cadaver closure is less firm. The sphincter in the male cadaver possesses fully the competence for small and median capacity which the bladder in the living subject and during rest requires from the structures surrounding the ostium. In the female cadaver this competence only reaches a minimum. In older individuals the resistance at the sphincter is of such extent as to resist the intravesical pressure increased by the strongest contraction of the abdominal muscles. There must be admitted also a certain tonus of the sphincter which exists during life to account for variations and increase of intravesical pressure, other than is found in experiments on animals. The increase and diminution of the sphincter tonus must correspond to that of the detrusor tonus. In increased tenesmus the sphincter vesicæ externus is strengthened by the whole urethral and perineal muscular apparatus: the sphincter ani and levator ani are also influenced to contraction. These muscles empty and close the urethral canal when the process of urination is interrupted (voluntarily). The feeling of vesical tenesmus is caused by a resistance to the contractions of the muscle of the bladder. Therefore the tenesmus is greatest when a sudden impediment is opposed to the already irritated detrusor contraction. In paralysis of the bladder tenesmus is frequently caused by the passive distention of the bladder. Frequently no such tenesmus exists. The muscles of the bladder can be voluntarily contracted and relaxed. The contraction and relaxation follows more slowly than in striated muscular fibre. The control over the detrusor contraction is exerted by the urethral and perineal muscular apparatus. The bladder contents being incompressible, resistance offered by the latter-named muscles soon wearies the detrusor apparatus. The inability to urinate in some persons (psychical) is explained by the momentary loss of control over the voluntary detrusor contraction. Direct faradization or galvanization of the bladder give no certain contraction.

In children and in all conditions where the influence of the cerebrum is cut off, and that of the lumbar center is intact, the emptying of the bladder is purely reflex. The existence of a center in the lumbar region controlling the closure of the urethra is not proven or nec-

essary, for the sphincter internus is controlled by the same center as the detrusor apparatus. Detrusor lumbar center would be the appropriate nomenclature. Acute lesions of the spinal cord cause retention by paralysis (lumbar region) or by diminution of tonus by a distention of the bladder and an impairment of its capability for contraction. In the first case the bladder remains paralyzed. In the second the bladder may recover itself and the organ may be emptied by reflex act. The theory of reflex inhibitory fibres is untenable as applied to the muscles closing the urethra.—*Zeitschr. f. Chir.*, bd. xxv, heft 1 and 2.

HENRY KOPLIK (New York).

VI. Neuralgia of the Bladder. By PROF. GUYON, (Paris). The causes are varicocele, diseases of testicle and kidney, locomotor ataxy and other forms of myelitis, (of which it is often the first symptom), hysteria, hypochondriasis and simply nervous tendency, inherited or acquired. It is only to the last 3 that he pays attention as the diagnosis otherwise is easy. The most common error is to confound it with painful cystitis, and the following are points to be looked to: In cystitis there are frequent micturition, pain and tenderness of bladder, and alteration of urine. In neuralgia, the urine is normal, there is no frequency of micturition, the bladder is not tender on pressure over hypogastrium, or through the rectum, nor on introduction of the sound, but there is a symptom which is present in all nervous people, or in those who are continually thinking of themselves—increased sensibility and resistance to the passage of an instrument through the membranous portion of the urethra, which is often mistaken for stricture. Further, the bladder will hold a considerable quantity of injected water, which it will not do in cystitis.

This neuralgia commonly occurs in people who suffer from similar pains elsewhere, and it is more frequent in men than in women. For treatment its cause (if there is one) must be removed; and for a nervous person, with no discoverable lesion, treatment for general health, and *very gradual* dilatation of urethra with bougies: it is important that the dilatation be not rapid or forcible. Hydropathy is generally very beneficial.—*Progrès Medical*. July 2, 1887.

H. DESVOEUX (London).

VII. Vesico-Urethral Suture and Uniting of the Symphysic Fissure for Congenital Exstrophy of the Bladder with Epispadias. By DR. G. PASSAVANT, (Frankfort on the Main). Of the previous procedures for treating this trouble, some have achieved partial success, especially Trendelenburg's plan, (*ANNALS OF SURGERY*, Feb. 1886, p. 168) of forced approximation with suture of the symphysic ends, and Demme's method, (Dr. Mörglin, 1855) of slow approximation by means of a compressing belt. P. advocates a plan based on essentially the same idea as Demme's. He considers that the pathology of this affection is of great importance in determining the treatment. Hence, he describes the condition in detail from 2 adult and 2 new-born subjects, and 6-8 patients.

The frequent statements, particularly in older works, that certain of the parts or structures are wanting, is not generally true. They are only displaced or misshapen. The ureters become dilated. In a preparation from an old woman they admitted a thumb. The pelvis of the kidney may also participate in the distention. Frequent causes of death are inflammation of the ureters, pyelitis, urethritis, and peritonitis. The statement of most authors that in congenital exstrophy the absent symphysis is replaced by a fibrous ligament, he finds to be incorrect. However, behind the position occupied by the symphysis in the norm. extends a band upcurved in the adult,—or ligament if only form and not histological structure be regarded.

It is most intimately connected with the bladder, and consists of the same tissue, principally smooth muscular fibers. Only at the ends is it partly tendinous representing the pubo-vesical and pubo-prostatic ligaments and the tendinous arc of pelvic fascia with the pubo vesical muscles arising therefrom. In the new-born this symphysic band is higher; in the adult, it flattens as the cleft widens, the bladder also settling down more and more.

In a preparation from a man of 18 years, he also found faulty ossification of various pelvic bones. There was no bony union any where between the 5 sacral vertebræ. nor between the lateral processes of the lower 4. The ilio-sacral synchondroses also permitted mobility. The ilium and pubes showed but slight osseous union. The inner surface

of the sacrum was not concave but nearly flat. The great sacral notch was narrower than usual, and the sacro-spinous and sacro-tuberos ligaments correspondingly were correspondingly shorter. Consequently, the pelvis is narrower antero-posteriorly but over wide transversely. This shortens the perineum.

Here the erectile bodies of the penis lie on its lower side. The bulbo-cavernous muscle is flattened, runs more transversely, and is not attached as normally to the outside but to the inside of the corpora cavernosa. In reality this depends on the corpora having turned half round. The muscle is attached just in front of the point where the bodies are flattened to the pubic bones. Here the corpora have to bend inwards to meet, and at the same time, they make 180° twist (out and downwards around their long axis).

Sections of the penis show that the corpora, as regards their albugineæ, are not united as in the normal and do not develop a single septum. There are two veins on the dorsum of the penis instead of the usual one. If each corpus is freed from its tissue connections and both are turned out and upwards, these two veins come together at the back of the organ. The cause of the half-turn in the corpora must lie principally in the cleft symphysis. The fact of its occurrence has never before been fully stated. In the female the relations are so different that no analogous change can occur.

Preparation for vesical suture. Approximation of the pubic bones, introduction of the bladder into the abdominal cavity and dilatation of the bladder.

He bases his method of treatment on the anatomical peculiarities briefly described above. His plan consists of a preparatory and an operative part. Of the former only does he treat in this article. The approximation of the pubic bones is permitted by the yielding of the ilio-sacral synchondroses. The advantages of the slow method are freedom from possible dangers (of the rapid method) and more natural readjustment of the various structures. This must be accomplished by continuous actions, as on interruption it retrogrades rapidly, and the synchondroses loosen, instead of becoming firm in the new position. Various points for the application of pressure are necessary that when one suffers another place may be substituted for a time.

Demme's leather girdles, with or without steel strips, too easily become hard and spoiled by the urine. Flat vulcanized rubber rings—used as tires on small wagon wheels—with rounded edges and tighter or fastener answer very well. The parts must be neared very slowly. Every-day inspection is necessary to avoid ulceration. A folded napkin between the legs helps cleanliness—if frequently changed. The child in its girdle may even run about a little.

A second (alternate) method of compressing the pelvis consists in laying the child so that the pelvis shall lie in a V-shaped cleft. This is simply made of two blocks of wood with their adjacent sides sloping to a hinge.

For a large child each block may be 18 cm. long, not quite as high, and 9 cm. thick. The angle at the hinge is something less than 90° —the less the angle the greater its action and vice versa. Of course, the angle can be decreased by wedging under the free end of either block, or increased by elevating the joint. The cleft walls are cushioned with leather down as far as the child's pelvis will sink. The child above and below is to be supported on the same bed by mattresses and cushions. Cleanliness necessitates a rubber cloth beneath and a urinary vessel just below the blocks. In this way simply direct lateral pressure is exerted on the pelvis and not pressure all around as with the girdle. Still, he has seen good results from the girdle. He leaves the child half a day in the cleft, then has it get up awhile with the girdle. He has had no success with girdles intended to act, like the cleft, from the sides. These touch the body at the back, but bridge free across in front. Still, a girdle with a screw arrangement may be recommended during and after suture.

As the pubic bones approach, the exposed bladder gradually recedes a little and takes on a more normal appearance. Its abnormal breadth diminishes and to a less extent it gains in height. Only the upper part is, in consequence of the abdominal pressure, still inclined to prolapse. It is now time to begin to dilate the bladder and accustom it to the proper place. For this the slowly inflowing urine is very suitable. His attempts, however, at closing the bladder water tight were unsatisfactory. By means of a little rubber arrangement ('sage-

femme') fastened either by a rubber bandage, or by a sheet of gutta-percha tied to the girdle and thigh-straps he succeeded partially. Another plan, however, proved more feasible. A small rubber bag is inflated, at first only to the size of a pigeon's egg. This is placed against the upper part of the bladder, after elevating the pelvis. The string and the mouth end lie upwards, and thus the urethral openings are left free. A circular plate of gutta-percha—its rounded edges extending a finger's breadth beyond the vesical border—holds this in place. The rubber girdle serves for holding this in place, except at its lower part where a second, triangular piece of gutta-percha is fastened above to the girt and below to the thigh straps. When the child lies in the split block the bladder has less tendency to prolapse and the plate can be retained by a rubber bandage. After the pubic bones begin to approach, the lower part of the bladder settles back and the ureter mouths are more protected.

For suture of the symphysis any approximation of the pubic bones less than contact is unavailing. When the latter can be achieved and the soft parts have lost some of their abnormal width, all is ready for suture, and this may include the bladder.

Some experiments as to the elasticity of the pelvis showed that in two cases cleft symphysis in the new-born, gaps of $1\frac{1}{2}$ and 2 cm. could be quite overcome by lateral pressure; in the cadaver of a $2\frac{1}{2}$ -year-old girl, after exsection of the pubic arch, a compression of $1\frac{1}{2}$ cm. was possible; in the cadaver of a 9-year old boy 1 cm. was possible; whilst in the cadaver of a young man but little compression was possible without infraction. Hence he concludes that puberty is the age-limit for achieving much by the method of slow compression.—*Arch. f. kl. Chir.*, 1886, bd. 34, hft. iii.

VIII. On Rupture of the Bladder Produced by Filling. By Dr. E. ULLMANN (Vienna). In the ANNALS OF SURGERY for January, 1887, some cases and experiments by Von Dittel, bearing on this question, were quoted. Besides 7 variously reported cases Ullman gives 2 new ones. These occurred from injecting the bladder in litholapaxy. By suprapubic openings and drainage both patients (a

man and a woman) recovered. From experiments on the cadaver he has tried to determine various factors relating to this question. He finds that :

1. Even a small quantity of fluid may cause the bladder to rupture (in 2 cases, 360 and 540 cc., respectively). In each of these cases the bladder contained pus, and its muscular layer showed granular or fatty degeneration.

2. Some bladders tolerate an enormous distention before rupture, in one case 2070 cc. and in one of Dittel's 5,000.

3. There is no rule as to intraperitoneal (on posterior wall) or extraperitoneal (through anterior wall) rupture. Where there was much fluid, *e. g.*, 500 cc., in the rectal balloon, the rupture was usually posterior and intraperitoneal; where little fluid, it did not appear to have any influence.

4. The tear usually is linear corresponding to the sagittal axis, less often oblique, rarely transverse and then extraperitoneal. He has only once seen a simple perforation (like a hole).

5. The mucosa seems to part first, then the muscular layer and finally the peritoneum.

6. Multiple ruptures are at least rare (2 cases). For these he is unable to state any rules.

7. Whether the abdomen is open or closed makes no difference—except in ballooning the rectum when with open abdomen only extraperitoneal rupture occurs.

8. Diverticula favor the early occurrence of rupture.

9. The peritoneum tears farthest, and outer layers farther than inner, thus forming a funnel tapering towards the bladder. Falck has shown that the vital differs from the post-mortem bladder capacity. Finally, he offers the latest statistics of vesical rupture in general. Of the 9 cases from operative filling, the particulars are unknown in 1. Only a catheter was introduced in 1 (fatal), and 1 was intraperitoneal (fatal). Of the remaining 6 operatively treated cases 4 recovered. The general lists collected by Bartels and by Rivington (1882) he completes to date. These represent 94 extraperitoneal with 20 cures, and 143 intraperitoneal with 2 cures. In agreement with Güterbock

he advises: In extraperitoneal rupture proceed to suprapubic incision. Bladder-suture may be practiced, or omitted as it does not offer full security. Sufficient drainage is essential. In intra-peritoneal rupture do laparotomy immediately, and sew up the bladder. Drainage of the abdomen is strictly necessary.—*Wien. Med. Woch.*, 1887, Nos. 23, 24, and 25.

WM. BROWNING (Brooklyn).

IX. Laparotomy for Intraperitoneal Rupture of the Bladder. By EDWARD L. KEYES M.D. (New York) and JOSEPH M. FOX, M.D. (Philadelphia). A man, *æt.* 22, suffering from this lesion was operated upon by Dr. Keyes twenty-two and a half hours after the accident, but *death* supervened eighteen hours afterward. Dr. Fox's case occurred in a man, *æt.* 45, the operation being delayed nearly twenty hours, and *death* occurring thirty-nine hours later from urinary intoxication and peritonitis, caused by the length of time the peritoneum was exposed to the urine between the injury and the operation.—*N. Y. Med. Rec.*, Dec. 24, 1887, and *Med. News*, Dec. 10, 1887.

JAMES E. PILCHER (U.S.Army).

ULCERS, ABSCESES, TUMORS.

I. Rectal Fistula in Czerny's Clinic. By CARL C. F. GREFFRATH (Heidelberg). This is a statistical compilation of sixty-one cases of rectal fistulæ operated upon in the clinic of Czerny, of Heidelberg. Fistula in ano was observed most frequently between the ages of 20 and 40 years (57% +); this corresponds to other authors. The youngest patient was aged 6 months, the oldest 70 years of age. It was found to be infrequent below the age of ten years. It has so happened that of the 61 cases only one occurred in a woman. (Bryant in 236 cases had 74 occurring in women). As to the situation of the fistulæ author gives the following figures:

65.5%	Fistula recti incompleta externa
4.8%	“ “ “ interna
29.5%	“ “ completa.

The incomplete external fistulæ were situated on the left side be-

tween the tuber ischii and anus in 39.4 % of the cases. The internal fistulæ were all above the external sphincter. The complete fistulæ were situated on the left side, between the anus and tuber ischii in 41.2 % of the cases. Of all the fistulæ ten cases showed undermined borders. Ten cases of the total occurred in tuberculous subjects (lung). Two later on developed diabetes mellitus. Thirty-eight showed normal internal organs on admission to the clinic. Among the scattering cases we find dysentery given as predisposing moment to the disease; hemorrhoids preceded in one case, in another chronic eczema was present. In others traumatism was given by patients as the causal agent. Forty-three gave history of a gradually developing abscess. The old mode of operating in the clinic of Czerny consisted in introducing a grooved director in the external opening of the fistula, the index finger of the left hand being in the rectum, and in complete fistulæ, passing the director through the internal opening bringing it outside the anus and dividing the tissues lying on the director in the usual way. But of late, 43 of the 61 cases, the tissues were divided with the *Paquelin knife cautery instead of the knife*. The advantages of this method are that the eschar, to a certain degree, protects the wound against infection during the first days after operation. There is very little hemorrhage. The granulation process is an active one subsequently, and the eschar prevents union of the wound. Of course antiseptics are in all these cases thoroughly carried out. *Iodoform* is especially to be recommended in these cases. The author discusses the relation of these fistulæ to pulmonary phthisis, but brings forward nothing new. This disease is not considered a contraindication to operation. In closing he records two very interesting cases of fistulæ in subjects suffering from diabetes mellitus. Author concludes that in all fistulæ we should examine urine for sugar.—*Deutsche Zeitsch. f. Chir.*, Bd. xxvi, hft. 1 and 2.

II. On Lupus Carcinoma. By DR. H. BAYHA (Tübingen). It is now well recognized that epithelial carcinoma may develop from cicatrices of lupus. Inclusive of the five cases recorded by the author, forty-two cases occur in the literature.

In first considering the selection of carcinomata for lupus cicatrices, we find that the cicatrix of lupus growths are of the same structure as ordinary cicatricial tissue. These growths must be classed among the cicatricial carcinomata similar to those developing upon the basis of cicatrices on the thigh and extremities. Eleven of the collated cases belong to this class (Devergie, Langenbeck, Esmarch, Trendelenburg, Schultz). These carcinomata occur as early as the 26th year. (Trendelenberg.) Most cases were in patients between 40 and 60 years. The interval elapsing between the healing of the lupus and the appearance of the carcinoma was 7 years (Esmarch) and 15 and 20 years (Langenbeck). Great malignancy and rapid extensive destruction of tissue is one of the characteristics of this form of growth. The cheek, the orbit, the nose and elbow have been the seat of the disease.

The second form of the occurrence of lupus and carcinoma consists in the development of epithelioma upon the site of a florid lupus. Epithelioma is an accidental complication of lupus, favored by the ever recurring irritation of the epithelial covering. The history of the development of carcinomata from foci of irritation in other parts of the body lent support to this theory. The rich vascularization of the lupus tissue and the irritation of modes of treatment favor malignant development. We have twenty-six cases in the literature of epithelioma appearing on the site of florid lupus. It is the more common of the two forms here discussed. In long standing and highly developed lupus growths there is an immense increase in the epithelial formations of the rete malpighii, not only into the corium, but also in a lateral direction. In such forms there is but a slight transition from true epitheliomata. These interpapillary projections into the lupoid tissue must be looked upon as a starting point for the development of carcinoma. Of these lupus carcinomata we have clinically to consider the statistics of 31 cases, occurring between the 20th and 70th year of life, and most frequently between the 40th and 50th year. The growth most commonly occurred on the cheeks (11 times), and less frequently on the face, ear, nose and arm. The duration of the lupus, previous to the appearance of carcinomata varies (10, 20, 50 years). Different classes of society are equally affected. These carcinomata are strikingly ma-

lignant. In most cases a round, flat, suppurating tumor constricted at the base develops in the midst of the lupus, and involves the deep seated parts very rapidly. There is rapid loss of strength, accompanied by fever, sleeplessness, rapid emaciation. The soil of lupus is favorable to such a malignancy (Kaposi, Lang). In ten operated cases, rapid return of the growth occurred in seven. In only one case is a cure recorded (Volkman). Therefore early interference with the knife is indicated in these growth.—*Beitrage zur klin. Chir. von Paul Bruns, Tübingen, 1887.*

CHEST AND ABDOMEN.

I. "Perineal Hernia." By LUDWIG EBNER (Graz). This monograph has for its object the investigation of the anatomical characters of this variety of herniæ, their classification and their probable ætiology. The dissections conducted in the anatomical institute of Prof. Zuckerkandal extend over a material of sixty subjects. The peritoneum in the first place on the floor of the pelvis is quite distant from the levator ani and in normal conditions it is so remote in the region of Douglas' pouch and so markedly distant at the sides in the region of the bladder that hernia is impossible. In males the peritoneum reaches as far as the trigone, in females to the posterior wall of the bladder. In exceptional cases the peritoneum stretches to the prostate, in female to the space between the rectum and the vagina. In these cases the possibility exists of the small intestine sinking lower than usual. But in perineal herniæ the peritoneal diverticulum must reach still nearer the floor of the pelvis.

A preparation of the levator ani next undertaken for the explanation of the anatomical origin of the hernia showed that in 25 individual subjects 47 distinct separations of the muscular fibres at the floor of the pelvis could be demonstrated: they existed between the levator and ischio-coccygeus (Henle) and between the ischio-coccygeus (Henle) and coccygeus.

Spaces between the muscular fibres are abundant in the levator. The resistance of the tissues in the cavum ischio-rectale will determine as to whether the hernia can be felt externally or not.

A hernia of this kind has for its external exit the opening in the levator, and its coverings are the skin, foot of the ischio-rectal fossa, the fascia of the pelvis, the subserosa and peritoneum.

A strongly-filled rectum exerts quite a pressure over the levator, and, though it is not mentioned in the literature, the rectum might easily form part of the contents of the hernial sac. The author has illustrated this by investigations and dissections of the perineal hernia in dogs. Though the clefts in the muscular tissue of the levator are closely connected with the causation of perineal hernia, their presence does not fully explain the same. The congenital anatomy of the peritoneum in Douglas' pouch, by which the same comes deeper toward the floor of the pelvis, is an important agent in the origination of these herniæ. A trauma alone without the presence of the above congenital pocket of peritoneum cannot cause these herniæ. Abdominal pressure, as in umbilical herniæ, may drive the coils of intestine into this pouch of Douglas, or any bodily exertion may likewise cause it. A subserous lipoma can hardly cause a perineal hernia. An investigation of the peritoneum in Douglas' pouch has shown it to be so delicate in embryo that it tears on the least manipulation. It is not hard to imagine that the peritoneum once torn, coils of intestine may easily be driven to and gain the floor of the pelvis. The author gives the following classification of these herniæ :

1. Those occurring in males taking a course between the bladder and rectum, causing a prominence in the perineum near the anus or scrotum (per. H. ant. or post.). In women likewise the course would be between the uterus and rectum and near the anus, or giving the patient a prominent tumor in the labium majus (H. per. post et H. labii maj. post. In the male the intestines may reach the floor of the pelvis, but cause no tumor (H. per. imperfecta). If the hernial sac or contents break into the rectum or bladder, we have a hydrocele or hernia into the bladder. In females we may have a protrusion of the posterior vaginal wall instead of the above.

2. In the female a hernia may originate between the bladder and uterus appearing externally in the labium majus (H. labii post). Here we may also have an anterior vaginal hernia into the bladder (H. vag. in. ant.)

3. Hernia of the bladder (without sac) and also of the rectum may appear in the perineum. Rectocele vaginalis belongs to this class.

4. Hernia labii maj. anterior belongs rather to the class of inguinal hernia.

Author concludes that perineal herniæ are congenital. They are not capable of originating from traumatism alone. The cavum between the bladder and rectum, and the rectum and uterus is deeper and more pronounced in the embryo than later in life. It varies in different embryos. The hernia at first descends in the median line, and when it reaches the deeper structures takes a course laterally to either side. It passes especially between the levator and ischio-coccygeus muscles or ischio-coccygeus and coccygeus muscles (Henle). These spaces can be easily demonstrated in man. All herniæ appearing at the outlet of the pelvis are varieties of the same class. The classification with reference to the transversus muscle is not practicable. Perineal herniæ in men, as in dogs, may be caused by constipation. Then follows a careful compilation of the cases of perineal hernia in the literature.—*Deutsch. Zeitschr. f. Chir.*, Bd. 26, Hft. 1 and 2.

HENRY KOPLIK (New York).

REVIEWS OF BOOKS.

DIE CHIRURGISCHEN ERKRANKUNGEN DES KINDESALTERS. Separat
Ausgabe aus Gerhardt's Handbuch der Kinderkrankheiten. 1887.
Tübingen: H. Laup; New York: G. E. Stechert.

THE SURGICAL DISEASES OF CHILDHOOD.

The contents of the book is as follows: *Part I. C. Shönborn* (Würzburg). The surgical diseases of children, general introduction and remarks on operations, bandaging, wounds and contusions. *R. Demme* (Berne). Anæsthetics. *J. Weinlechner* (Vienna). Surgical diseases of the skin. *E. von Bergmann* (Berlin). Diseases of the lymphatic glands. *C. von Mosengeil* (Bonn). Introduction to the diseases of the spinal column and the congenital diseases of the same. *Oscar Witzel* (Bonn). Acquired diseases of the spinal column. *C. von Mosengeil* (Bonn). Treatment of lateral curvature of the spine (scoliosis). *Part II. F. Beely* (Berlin). The diseases of the head in childhood. *F. Trendelenburg* (Bonn). The surgical diseases of and operations on the neck. *Ed. von Wahl* (Dorpat) Diseases of the bones and joints in children. *F. Beely* (Berlin). The diseases of the hand in childhood. *E. Mensel* (Gotha). The diseases of the foot. *J. Bókai* (Budapest). The diseases of the rectum and anus. *Theodor Kocher* (Bern). Herniæ in children.

These dissertations, the first four of which were printed once previously, in the year 1882. fill two large octavo volumes of 664 and 790 pages respectively, which are uniform with the other ten volumes of Gerhardt's Handbook. The illustrations, over 100 in all, are woodcuts.

The handbook itself is so well known, and the names of the collaborators are such distinguished ones in the special branches of their contributions that it is unnecessary to add any word of comment. Those who wish to consult German authorities upon the details of pathology and therapy of children's diseases, will find the book a very valuable addition to their library.

DIE PATHOLOGIE UND THERAPIE DER GELENKENTZÜNDUNGEN. Von Prof. Dr. MAX SCHUELLER in Berlin. 1887. Wien und Leipzig: Urban und Schwarzenberg. New York: G. E. Stechert.

THE PATHOLOGY AND THERAPY OF THE INFLAMMATIONS OF THE JOINTS.

This pamphlet, containing about 100 large octavo pages, is in the main a reprint of the author's article on the subject in Eulenberg's Encyclopedia.

The principal forms of arthritis are treated concisely and essentially from a clinical point of view, the author recognizing that a classification of joint diseases upon purely anatomical or pathological principles is impracticable. It must not be understood, however, that the pathology of the various forms of joint disease has not been given sufficient signification. The author's name, so prominently connected with the pathology of his subject, is sufficient guarantee of the contrary. Micro-organisms play an important part in the etiology of many of the joint affections discussed, and even the acute serous synovitis occasioned by traumatic influence is due, we are told, to the introduction of some specific cause exciting inflammation (*entzündungserreger*) by the blood current. In the author's opinion the arthritis deformans of advanced age is due to the same cause. But even if some readers are not inclined to adopt these last assertions, they cannot but admire the scholarly manner in which such views as these are developed and substantiated.

The treatment of the diseases of the joints has received special attention and comprises about half of the subject matter. There is nothing to find fault with. The treatment is discussed under general headings, both the local and the general—probably, in order to avoid needless repetitions, which an arrangement according to the disease might necessitate.

An extensive list of the literature of the subject is appended.

HAND-ATLAS DER ANATOMIE DES MENSCHEN. Von Prof. Dr. C. E. BOCK. Siebente Auflage. Vollständig umgearbeitete, verlusstert, erweitert und mit erläuterndem Zwischentext versehen von Dr. ARNOLD BRASS (Marburg i. Hessen). 1887. Leipzig: Reugersche Buchhandlung; New York: G. E. Stechert.

ATLAS OF HUMAN ANATOMY.

In getting out a new edition of Prof. Bock's anatomical plates, the

publishers have taken pains to include all the modern advances of anatomical literature in the representations; many subjects, such as the brain and the spinal cord have been entirely rewritten and illustrated afresh. Besides this many new features are apparent in the plates. Their size has been changed, and they now are but half as large as formerly; the drawings, most of which are the same as of old, have all been supplied with the names of the parts in print. Each plate is accompanied by a printed description. In spite of the improvements contained in the new edition, the price is less than it formerly was, being quoted at mk. 30.

HANDBUCH DER TOPOGRAPHISCHEN ANATOMIE. Von Dr. Fr. MERKEL. Prof. in Königsberg. Erster Band, Erste Lieferung. 1885. Braunschweig: Fr. Vieweg und Sohn. New York: G. E. Stechert.

HANDBOOK OF TOPOGRAPHICAL ANATOMY.

This book is intended for the use of physicians rather than students of medicine, and it aims to give the anatomical data in a manner suitable to the requirements of the practitioners at the bedside of the patient. This object has been achieved not only by giving prominence to the more recent advances in therapeutics in their anatomical bearings, but especially by the insertion in the text of numerous beautifully executed and variously colored wood cuts. The method of transparent drawing has been largely made use of, and in most of the figures the outlines of the deeper as well as of the more superficial parts are superimposed upon the drawing. This facilitates the study of the anatomical details on the living subject.

The first part of the first volume—all that has as yet appeared of the work—promises well for the rest of the work, both on account of its being so well up to date in the more recent anatomical discoveries, as also for the novel manner of presenting anatomical data from a clinical point of view.

LEHRBUCH ZUR AUSBILDUNG VON HEILGEHULFEN,* mit Berücksichtigung der Wundepflege, Krankenaussicht und Desinfection. Von Dr. WERNICH, in Koslin. 2te Aufl. 1887. Berlin: Aug. Hirschwald. New York: G. E. Stechert.

TEXTBOOK FOR THE TRAINING OF NURSES, WITH SPECIAL REFERENCE TO THE MANAGEMENT OF WOUNDS, THE CARE OF THE SICK, AND DISINFECTION.

A useful little book of about 150 pages, which has been officially introduced by the government into some parts of Germany, and already appeared in the second edition.

It contains a chapter on the anatomy and physiology of the body and one on emergency-cases and injuries. Other sections treat of the transportation of the injured and invalids, of assistance to be rendered during operations, and during the application of splints and bandages, of the care and management of the sick room, and of the necessary measures in cases of contagious diseases.

Considerable attention is also given to those chapters in minor surgery which call for independent action on the part of nurses.

An index, lists of instruments, etc., and some few legislative notes add to the usefulness of the book.

W. W. VAN ARSDALE.

THE DETAILS OF OVARIOTOMY.

BY ALBAN DORAN, F.R.C.S.,

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OVARIOTOMY and allied varieties of abdominal section depend perhaps more than any other operation upon matters of detail. The history of ovariectomy, as given in Sir Spencer Wells' standard work and in certain recent American publications, is a history of details. In iridectomy and lithotomy pure dexterity is of the first importance: in every operation successful after-treatment depends upon matters of detail; but these matters form the very core and substance of an ovariectomy of average difficulty.

Hence, rival specialists dispute over details, such as the proper material for ligature, the kind of knots to be used for securing the pedicle, the merits of Listerism, and the practice of flushing the peritoneal cavity with warm water. I have witnessed the performance of a very large number of ovariectomies by specialists, and a considerable number by able surgeons not used to the operation, and I have seen troubles arise during operation and known of bad results afterwards, in the latter case, solely because the general surgeon does not know, or fails to appreciate necessary details.

The patient will never be the better for sponging which does not clean, drainage which does not drain, ligatures of the pedicle which give way through faulty methods of tying them, sutures of the abdominal wound pulled too firmly and a perfunctory irrigation of the peritoneal cavity where thorough flushing is necessary. Her life depends on a correct understanding and application of matters of detail. I shall, therefore, say a few words on the subjects above indicated.

An intelligent use of the sponge is essential in ovariectomy. The assistant should constantly clean the integuments around the abdominal incision throughout the operation. The intestines above and around the incision must be guarded in the later stages of ovariectomy by flat sponges passed boldly into the peritoneal cavity, care being taken to place them in front of the omentum. A sponge must be kept in Douglas' pouch, and that sponge should not bear any silk threads, left pendent from the wound, as some surgeons recommend. When the operator takes care to search Douglas' pouch, as well as to count the sponges at the end of the operation, no sponge need be left behind; the precaution above noted is therefore needless, whilst threads attached to sponges are greatly in the way of necessary manipulations. In certain operations on a very limited area of the abdominal cavity, Douglas' pouch may be guarded by a sponge bearing threads, but when tumors have to be removed or a wide area of peritoneum searched and handled the practice is objectionable.

In order to cleanse the sponges, when they have been soaked in fluid of a suspicious nature, there is no solution better than sulphurous acid, one part to five of water. It makes the sponges beautifully white and clean. After three or four ovariectomies or abdominal sections of any kind the sponges should be cleaned in this manner, and the process should never be omitted after an operation where a dermoid or suppurating or gangrenous tumor has been removed. Clean white sponges have the advantage of displaying any adventitious matter that may cling to their surfaces, so that the operator may remove it before introducing a sponge into the abdomen. Some antiseptic solutions cause the sponges to turn dark brown so that dirt or dry pieces of coagulum may lie on their surfaces, yet escape observation. Sulphurous acid has not this disadvantage.

In relation to the abdominal wound, there are many matters of detail which must not be overlooked. Inexperienced operators are apt to make the incision too high up in the abdomen, or more correctly speaking, they neglect to bring it down sufficiently low, towards the pubes. This mistake may cause much trouble when the pedicle has to be drawn out of the

wound for transfixion, and it greatly impedes a thorough exploration of the pelvic viscera. Fear of wounding the bladder is the chief reason why the abdominal incision is made too high, but the operator should trust neither to the position of the lower end of the wound, nor even to the catheter, but solely to the appearance of structures as they are exposed one by one by steady and even incision. Should the tumor prove to be uterine, the empty bladder may reach some distance above the pubes, whilst a full bladder is readily recognized by a careful operator.

The incision need never be made more than two inches long at first, for should the tumor turn out to be an ordinary ovarian cyst with few or no adhesions the operation will be as simple as art can render it, and the short incision will, in every respect, prove convenient; whilst, if necessary, the operator may make it three, four, five or six inches* long, or longer, at any subsequent stage of the operation. Long incisions, when the abdomen is not distended by great masses of fluid or solid, cause prolapse of the intestine, and therefore necessitate the introduction of many flat sponges high up in the abdominal cavity. In exploratory operations for small diseased ovaries or tubes, a long wound may prove a distinct impediment.

When the operator fails to cut along the *linea alba*, so that he opens the sheath of one rectus instead of hitting off the space between the two muscles, he should not make a second incision to the right or left of the first, but should rather turn up the sheath on one side of the exposed muscle until he reaches its inner border. Two incisions look untidy, confuse the appearances of the parts and make a kind of strap, more likely to slough than a carefully dissected flap of the sheath, and less suitable for the application of the sutures.

The pressure-forceps will prove sufficient to check hæmorrhage from the divided vessels in the abdominal wound, and if properly applied, so that the bows and shanks lie downwards, even six or eight such forceps will never be in the operator's way throughout the course of the operation. After ten minutes any forceps may be taken off, if wanted for a more important purpose. Ligation of an artery in the abdominal wound is very rarely needed. In a series of nineteen ovari-

omies performed by myself I only once found it necessary. The practice is far too common in general hospitals; it defeats one of the great aims of the ovariologist, the insurance of an abdominal cicatrix as firm and as sound as possible, and not rarely causes suppuration, and it denotes an ignorance of the object and the use of the pressure forceps.

At the close of the operation, the sutures must not be pulled too tightly. A tight suture interferes with the vascular nutrition of the parts which it embraces, and sets up irritation. Exudation occurs and a hard mass forms which may break down so as to become an abscess. On the removal of the suture, its track is very liable to suppurate. All these complications prevent perfect cicatrization. The evils of a tight suture are felt long after its removal. I have seen a hernial protrusion commencing at a very small point in the middle of an old ovariectomy wound, evidently the site of a tight ligature.

The ligature of the pedicle is a process demanding extreme attention to details. The operator must be perfectly sure that he knows how to tie the knot which he intends to employ for securing the pedicle. He must not look upon some special knot, recommended by some particular authority, as a talisman. The Staffordshire knot is excellent when tied by a dexterous and experienced surgeon, but it is not the easiest, and at the same time, the safest for a beginner. Should the operator feel uncertain about which end of the ligature is to be passed uppermost, he will probably make some other error, whilst the converse holds good, a difficulty about the level of the ligature or the firm inclusion of both borders of the pedicle rendering the operator liable to get confused about his knot. He should practise the knot, first on a towel or a rag, with stout twine, then on some animal tissue as like a pedicle as possible, using the same kind of ligature as that which he means to employ at operation.

The silk used for ligatures need never be very thick. No. 4 Chinese twist is the stoutest ever required for broad pedicles; No. 3 is, as a rule, quite sufficient. Dr. Keith rightly expostulated, a few years since, against the use of thread "thick enough to hang the patient." A ligature if too stout,

tends to prevent the necessary approximation of the tissues on each side of the groove which is formed. Great care must be taken not to transfix a vessel with the pedicle needle. An ordinary "Liston's needle" with a true point, not very sharp, is the safest instrument to employ for the purpose of transfixion. The form of pedicle-needle with a thick, blunt end is liable to split the pedicle, a grave accident sometimes overlooked. Whatever be the knot upon which the operator has decided, it should be pulled against one of the free borders of the pedicle and cut against the side of the pedicle. When two knots are tied, they must be pulled against the opposite free borders. I trust that these diagrams will make my meaning clear. In both, the thickness of the pedicle is indicated by the long shaded oval figure, and the free borders lie at *a* and *b*. In both, again, transfixion has been effected and the ligature has been passed partly through the pedicle. In Fig. 1 the loop of the ligature *g* has not been cut, but one end *e* of the silk

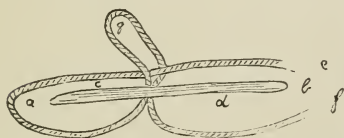


FIG. 1. FIRST METHOD OF LIGATURING THE PEDICLE.

has been passed through that loop. The two ends *e, f*, must in this case be tied against *b*; then the loop enclosing the letters *a, c*, and that which will include the letters *d, b*,

will be made fast evenly and simultaneously and the greatest pressure will be as it should be, at *a* and *b*, the two free borders of the pedicle. The ends *e* and *f* must not be tied against the pedicle at *d* for the two loops cannot, in that case, be made so secure, and the silk is apt to fray against the original loop *g*. This principle of securing the loops is always insisted upon by Dr. Bantock who prefers the form of ligature represented in Fig. 1, and from personal experience I can vouch for its accuracy. The same rule applies to the method of ligature advocated by Mr. J. Knowsley Thornton (Fig. 2). The loop *g* in Fig. 1 has been cut and the threads (for the original has thus been made into two threads) are crossed at *l*. The two ends *h, k*, must be pulled tight against *a*, and not against *c*; the two ends *e, f*, must be made fast against *b*, and not towards *d*. This form of ligature is simple and easy for the beginner.

In all cases, when the threads *e, f*, are brought round the pedicle after the primary ligature has been secured (a precaution usually

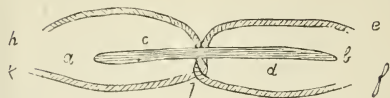


FIG. 2. SECOND METHOD OF LIGATURING THE PEDICLE.

needed), they must be drawn tight against *a*, and not against the side of the pedicle. Care must also be taken that they are made to sink accurately into the groove formed by the primary ligature. Neglect of the principles above noted will entail splitting of the pedicle, slipping of the ligature, or sloughing of the tissues on the distal side of the ligature groove. Through ignorance of the right method of tying ligatures, the earlier ovariologists had bad results even in simple cases, where the intra-peritoneal treatment of the pedicle was attempted; hence their reluctance to discard the clamp.

Drainage is becoming the ovariologist's sheet anchor. Much misapprehension exists about this term which the specialist employs to signify, not a simple hydraulic arrangement, but a contrivance by which he is enabled to remove fluid which collects in Douglas' pouch after the operation. When the operator trusts to hydraulic laws alone, he is likely to lose his case, for, as the fluid rises in the tube and escapes into the dressings above, more or less slowly, what remains in the tube may continue to irritate the peritoneum below or may become septic and may do more harm than ever. On the other hand, when the operator understands how to drain, he removes the fluid in the tube every two hours, often before the column has had time to overflow into the dressings. This process is easily performed by means of a piece of india-rubber tubing attached to a common glass syringe. It must be continued as long as the fluid remains colored or smells even in the least degree offensive. A nurse may readily be trained to manage the drainage tube properly. As a rule, the tube is not cleared at sufficiently short intervals, so that the column of fluid which it contains is often allowed time to undergo some change pernicious to the patient.

In the case of an incomplete ovariectomy, the proper use of the drainage tube becomes evident. Thus in one of my own

patients, I performed abdominal section and discovered a large multilocular cystic sarcoma, universally adherent except to the anterior parietes of the abdomen. I had thrust the trocar into one cyst and nothing but grumous sarcoma-tissue came away. As removal of the tumor was out of the question, I sewed the edges of the cyst which had been opened to the abdominal walls, after carefully cleaning its cavity which was packed with iodoform wool. In thirty hours, the patient's condition became very bad, and I removed two ounces of fetid fluid from the cyst. Although I had already dressed the wound regularly, I felt that without a drainage tube the opened cavity could not be kept sweet. I therefore passed a tube into the cavity, and frequently removed the fluid which rose up through the tube, finally injecting weak carbolic or, later on, iodine solution. Within twenty-four hours after introduction of the tube, the patient's condition visibly improved. I sat up during the night and cleared the tube myself every three hours, the patient feeling and looking distinctly better after every dressing, and I afterwards felt that it would have been well had I cleared the tube yet more frequently. The tube remained for nineteen days in the cavity; after a time it did not require emptying more than every three hours. After that period I was able to clear away sloughy tissue, and finally succeeded in making the cavity perfectly clean.

The patient was able to go home, and lived six months. In this case death within a few days after operation was warded off by drainage, that is, by contrivance which enabled me to remove the fluid products of decomposing sarcoma-tissue almost as soon as they collected. In the practice of others I have seen precisely similar results following drainage of Douglas' pouch. The statement made by certain surgeons that drainage cannot be effected by passing a tube through an abdominal wound into Douglas' pouch is contradicted by facts, but these gentlemen have been misled by failing to understand what is meant by drainage, a fallacy which I have already discussed. Some authorities declare that exudations which collect between coils of intestine cannot flow into Douglas' pouch, and therefore cannot be removed through the tube. This is probably true, but the frequent removal of what can be withdrawn through

the tube will prevent septic changes in what is left behind.

Irrigation, or flushing out the peritoneum, is a proceeding which must be done boldly or not at all. A few quarts of hot water will do more good than a few pints. I believe that three beneficial agencies are effected by flushing. It washes away morbid fluid, clots and shreds of tissue, it checks hæmorrhage, lastly, it prevents or counteracts shock by diffusing warmth over the serous membrane and viscera. The more boldly the water is poured in, the more surely will the fluids and clots be dislodged, the more thoroughly will the hæmorrhage from adhesions be checked, and the more completely will shock be counteracted. I have seen a pint or two of water emptied into the peritoneum, with the result of not effecting any of the desirable purposes above indicated. Flushing nearly always demands the subsequent introduction of the drainage tube.

The reason why I prefer to speak of flushing rather than of irrigation is implied in the above remarks. The process in question should be different from "irrigation" as understood when applied to an inflamed joint. The water employed by the operator must not be dripped into the peritoneal cavity, but poured in like a flood, else it will not effect its object. The hæmostatic action of a flood of hot water is often apparent to the eyes of a surgeon. A rush of ascitic fluid has the same effect. I once assisted at an exploratory operation where a short incision was made through the abdominal walls very thick from subcutaneous deposit of fat. Before all the divided vessels in the edges of the wound could be secured by pressure forceps, the peritoneal cavity was opened and gallons of hot ascitic fluid shot out with great force. They poured over the right edge of the wound, which at once became pale, and all bleeding ceased. This condition continued till the wound was sewn up. In the meantime there was free hæmorrhage from the left edge of the wound. The dislodgement of noxious material by flushing is self-evident, and almost as apparent to the operator is the manner in which the application of warm fluid to the peritoneum counteracts shock.

THE RESULTS OF LAPAROTOMY FOR ACUTE INTESTINAL OBSTRUCTION.¹

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When Madelung opened the discussion on the results of laparotomy for intestinal obstruction, in the last Congress of German Surgeons, he declined to consider the subject statistically, because he thought the figures could not lead to any valuable conclusions, and turned the discussion upon the proper methods of performing these operations. Although this opinion seems in the main correct, yet a statistical study of these results can at least be made to emphasize certain truths already known, even if it does not demonstrate any new facts.

In the lists of cases of laparotomy for intestinal obstruction which have been hitherto published, the acute and chronic forms have not been separated with sufficient care. In making the present collection, I have accepted only cases of acute obstruction, adhering to the definition given by Bryant (Harveian Lectures for 1884), including only those cases in which there was some strangulation of the gut—shown by the acute symptoms, the severe vomiting, and the early collapse; as distinguished from the milder, and more slowly developing symptoms which depend merely upon the obstruction to the onward movement of the contents of the intestine. It is unnecessary to dwell upon the great difference in the prognosis afforded by these two classes of cases.

I have also excluded all cases in which the symptoms developed after the reduction of a hernia, except those in which the diagnosis of hernia had not been made, or the obstruction was caused by some condition which could not be relieved by a simple modification of the ordinary herniotomy, or the cause

¹Read before the annual meeting of the New York State Medical Society, at Albany, February 8, 1888, as a part of the discussion on acute intestinal obstruction.

of obstruction was altogether independent of the hernia. A few cases of stricture, and tumor of the intestine, in which the symptoms first made their appearance in the guise of an acute obstruction, have been included.

For the collection of these cases I am chiefly indebted to Mr. George H. Cobb, of New York, candidate in medicine.

The collection begins with the year 1873, when the principles of antiseptis may be said to have first come into general use, for Schramm has already shown that the mortality for these operations before that date was 73%, while from that year to 1883 it fell to 58%. (If we exclude all but the acute cases from Schramm's list, the percentage is found to be 75% before 1873, and 63% after that date).

TABLE 1.

	Totals.	Recovered.	Died.	Mortality Per cent
Intussusception.....	71	17	54	76.0
Volvulus.....	45	8	37	82.2
Adhesions.....	33	11	22	66.6
Bands and Diverticula.....	97	39	58	59.8
Internal Incarceration.....	28	11	17	60.7
Stricture.....	5	3	2	40.0
Tumors of the Bowel.....	15	4	11	73.3
Foreign Bodies.....	14	4	10	71.4
Miscellaneous.....	11	1	10	90.9
Undetermined.....	9	4	5	55.5
Totals.....	328	102	226	68.9

Table I. shows a total of 328 cases with 102 recoveries and 226 deaths, the percentage of mortality being 68.9—a higher percentage than that of Schramm's collection. This increase is probably due to the fact that, since laparotomy has become a recognized method for the treatment of intestinal obstruction, many more cases have been published than formerly when, by the influence of Nèlaton and his followers, it was kept under the ban of professional disapproval. But even

this great mortality doubtless falls short of the true death-rate, for many fatal cases are still suppressed, while nearly all the successful ones are published. As Treves remarks, there are few surgeons of large hospital experience, who have not met with two or three unsuccessful cases in their practice.

One of the principal causes of this high death-rate is the delay which takes place in putting the patient in charge of the surgeon. This delay is not to be measured merely by the lapse of time, but by the failure of the patient's strength, and that failure depends upon the severity of the symptoms, quite as much as upon their duration. Consequently an analysis of the mortality with reference to the duration of the symptoms, as in Table II., shows but little variation from day to day. The low mortality in the cases operated upon in the third week is

TABLE II.

<i>Duration of Symptoms.</i>	CASES.			CONDITION OF THE FATAL CASES.			<i>Mortality Per cent.</i>
	<i>Total.</i>	<i>Recovered.</i>	<i>Died.</i>	<i>Good.</i>	<i>Bad.</i>	<i>Undescribed</i>	
1 day.	13	5	8	1	4	3	62
2 days.	18	5	13	1	5	7	72
3 days.	33	9	24	2	12	10	73
4 days.	34	0	25	2	4	9	73
5 days.	37	13	24	2	15	7	65
6 days.	41	11	30	5	15	10	73
7 days.	21	8	13	1	7	5	62
8-14 days.	63	13	50	5	30	15	79
15-21 days.	13	6	7	1	2	4	54
Several days.	28	9	19	1	3	15	68

to be taken merely as an indication that the form of obstruction for which the operation was performed was not very acute. The table also shows that the condition of the patient in the fatal cases varied but little, showing that when the symptoms were very acute the operation was performed early, and when subacute it was delayed until the patient was in the same state of collapse as resulted earlier in the acute cases. The rule in every case seems to have been to wait until there was little or no chance of recovery.

Let us look at the facts in regard to the cause of death in these cases, as shown in Table III. Under the heading "various complications" are included phthisis (1 case), pneumonia (4 cases), abortion (1 case), perforation of typhoid or tuberculous ulcer of the bowel (2 cases), abscess bursting into the peritoneal cavity at the time of operation (2 cases), diarrhœa subsequent to the operation (1 case), and paralysis of the gut persisting after the removal of the cause of obstruction (2 cases). By "sepsis" is meant septicæmia, pyæmia, or peritonitis, developing after the operation, and not due to gangrene of the bowel—the latter cases being included under the title "gangrene of the gut."

TABLE III.

<i>Cause of Death.</i>	<i>Totals.</i>	<i>Intussuscep.</i>	<i>Volvulus</i>	<i>Adhesions.</i>	<i>Bands, etc.</i>	<i>Int. incarc.</i>	<i>Stricture.</i>	<i>Neoplasms.</i>	<i>Foreign bodies.</i>	<i>Miscellaneous.</i>	<i>Undetermined.</i>
Condition, very poor.....	42	13	8	3	8	2		4	1	2	1
Collapse.....	51	13	11	4	16	3	1	1	1		1
Moribund.....	8—101	2		1	4			1			
Complications, Peritonitis.....	12	2	2	1	5	1			1		
Gangrene of gut.....	16	5	1	2	5	2				1	
Various.....	13—41	2	2	3	4	1					1
Cause of obstruction not found.....	19		5	3	3	1			1	4	2
Cause of obstruction irremediable.....	9—28	3	3				1		1	1	
Prolonged operation.....	3			1	2						
Shock.....	13	5	2	1	3	1				1	
Sepsis not due to gangrene.....	17	6		2	3	2		2	2		
Undetermined.....	12—45	3	1	2	1			1	3	1	
Details wanting.....	11		2	1	3	3		2			
Totals.....	226	54	37	22	58	17	2	11	10	10	5

In 101 cases, the failure of the operation was due directly to the poor condition of the patient, who was actually moribund in 8 cases. In the majority of the cases with complications, 41 in all, the fatal result was also really due to the condition of the patient, for the existence of peritonitis or gangrene of the gut at the time of operation shows that there had been too

much delay in resorting to operative interference. The majority of these cases, however, died within a few hours of the operation, and if the reports had been fully given, probably nearly all of them could be included among the cases in very poor condition. It must be noted, however, that in two cases the peritonitis found at operation was due to perforation of the gut, caused by attempts to remove the obstruction by large injections.

In 28 cases the cause of obstruction was not found, or could not be removed, and in 11 the reports are too deficient in detail to allow us to form any opinion as to the cause of death.

Deducting the foregoing cases from the gross mortality, as they throw no light upon the dangers of the operation itself when performed under reasonably favorable conditions, there are only 45 cases remaining. Of these 45 cases, 13 died of shock (being in fair condition at the time of operation); in 3 cases the unusual length of the operation may be assumed to have been the cause of death; and in 17 cases, sepsis, probably due to the operation, was the cause of death. In 12 cases the cause could not be definitely ascertained, but as the majority died within 24 hours after the operation, it was probably shock and exhaustion.

These figures are too small for sound deductions, but they indicate that the causes of death, when the patient is not in a bad condition, are sepsis and shock, in an equal number of cases, and emphasize the necessity for an antiseptic and brief operation.

The necessity for making the operation as short as possible cannot be too strongly emphasized, and Table IV has been arranged to show the results of the various methods of treatment adopted by the surgeon, or forced upon him by the exigencies of the case, with especial reference to this factor.

It becomes at once apparent that the most essential requirement for success in these cases is the removal of the cause of obstruction, for in 247 cases in which this was accomplished, the mortality was only 62.7%; while in 74 in which it was not done, the mortality was 86.4%. Indeed, in the cases of obstruction by intussusception, volvulus, adhesions, bands and internal incarceration, in which the obstruction was not re-

TABLE IV.

TREATMENT.	ALL VARIETIES.				INTUSSUS., VOLVULUS, ADHERIONS, BANDS, INTERNAL INCARCERAT.	
	Recov.	Died.	Total	Mortality Per Cent.	Cases.	Mortality Per cent.
Obstruction removed, simply.	81	105	186	56.4	183	56.8
“ “ artif. anus.	5	10	15	66.6	12	75.0
“ “ resect. & suture	6	39	45	86.6	30	86.6
“ “ gangrene. gut left.	0	1	1	100.	1	100.
“ “ total.	— 92	— 155	— 247	62.7	— 226	61.9
“ not removed, artif. anus.	9	24	33	72.7	16	100.
“ “ “ nothing done.	1	40	41	97.5	25	100
“ “ “ total.	— 10	— 64	— 74	86.4	— 41	100.
Details wanting.	— 0	— 7	— 7		— 7	
Grand Total.	— 102	— 276	— 328	68.9	— 274	68.6

moved, 41 in number, not a single one recovered, although in 16 an artificial anus was made.

When the operative interference was limited to finding and removing the obstruction, without wounding the bowel, the mortality was only 56.4 %, calculated on 186 cases; when it was necessary to establish an artificial anus after the obstruction had been relieved (owing to gangrene or rupture of the gut) the mortality rose to 66.6 %, in 15 cases; and, finally, when an attempt was made to suture the wound in the intestine, whether it involved the entire circumference or not, the mortality reached the extreme point of 86.6% in 45 cases. Only 10 % of the deaths in the last two classes of cases were from sepsis due to the operation. and not more than the usual number (50 %) were due to the condition of the patient, while 23 % were due to the duration of the operation and to shock.¹

¹A study of the causes of death in the last two classes of cases, 49 deaths in 60 cases, shows that death was due to the bad condition of the patient in 24 (50 %); peritonitis and gangrene at the time of operation in 2; other complications in 3; prolonged operation in 3; shock in 9; sepsis in 5; unknown in 3.

These figures present an additional plea for making the operation as short as possible, and especially for refraining from any attempt at an elaborate suturing of the intestine.

An interesting result is obtained by a separate classification of all the cases in the list in which the operator has had three cases or more. Thus, 17 operators performed 87 operations, with a mortality of 67.9 %, which is remarkably near the mortality calculated upon all the cases in the table.

The rival of laparotomy in the treatment of acute obstruction is enterotomy, or more properly enterostomy—the creation of an artificial anus, without attempting to find and remove the cause of obstruction. Enterostomy is merely a palliative operation, relieving the pressure of the intestinal contents behind the obstructed point, and not removing the cause of obstruction, except so far as it may be effected by relieving that pressure. That a complete cure can be brought about in some cases by enterostomy is proven by a few recorded cases in which the feces resumed their natural passage soon after the operation, although nothing else had been done to remove the cause of obstruction. But these cases are very rare—how rare is evident from the figures just given, showing that of 16 cases in which the obstruction was caused by intussusception, volvulus, adhesions, bands, or internal incarceration, in which laparotomy was performed and the obstruction was not removed but an artificial anus established, not a single case recovered.

The only accessible figures in regard to enterostomy performed for intestinal obstruction, are those of Treves, giving a mortality of 41 out of 61 cases—67.2 %. This is very little better than the death rate of laparotomy just ascertained, 68.4 %. It must be acknowledged that some improvement may be shown by more recent statistics, but that improvement must be very great before the surgeon can adopt enterostomy with such small chances of cure, in preference to laparotomy, which at a slightly greater risk, offers every opportunity for the exact diagnosis and complete removal of the offending cause.

In conclusion, we may repeat that the analysis just made shows a very high rate of mortality for laparotomy in these

cases, but that this high rate of mortality is due chiefly to the bad condition of the patient at the time, the operation having been too long delayed, and that it will not be difficult in the future to reduce the mortality by avoiding this error, and by making the operation as brief as possible. By operating earlier, we shall not only have the patient in better condition, but we shall avoid the dangers of peritonitis and gangrene of the gut, and the difficulties caused by excessive tympanites. A short, simple operation gives almost the only hope of success, and the earlier the operation is performed, the shorter and simpler it may be made.

THE HISTORY OF ABDOMINAL SECTION IN ALBANY, WITH A REPORT OF SEVENTY- FIVE CASES.

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BELIEVING that the time has come when every case of abdominal section should be reported, I have endeavored to give in this paper an accurate report of the work done in Albany. While I could wish that this history presented better results, I am convinced that it fairly represents the early struggles of this branch of surgery in this country.

Though the mortality was great during the first years of our work in this line, I am satisfied that, by an honest presentation of facts, we can convince our patients and their friends that we have reached such a degree of success as to be able to offer them every encouragement to have an early operation. I believe it to be the duty of every operator to collect from his own medical territory every case favorable or not, and give it to the world, and I venture to predict that the statistics so collected will demonstrate the fact that there must, and will be surgical centres for doing this branch of surgery. Undoubt-

edly the success that has attended the operation of ovariectomy in England, has been largely due to the few operators who have been engaged in the work, and to the fact that the country there is not so vast, but that the afflicted English woman has been able to reach these centres promptly, and by the success that has followed, her sisters have also been induced to undergo an early operation. Our American women are entitled to this same degree of confidence and hope, and, American operators can now give it to them.

I think I will be supported in my opinion that ovarian cases are more numerous among the laboring classes and those of moderate means than among the wealthy. Hence, the item of expense must be considered by nearly all who are so afflicted, and as the expense of reaching and remaining in great medical centres is so great, many will be deprived of the relief they might obtain were they able to go beyond a moderate distance from their homes. For this difficulty we have but one remedy. Owing to the great extent of our country, we must have, for doing this work, a proportionately greater number of operators and surgical centers than are required abroad.

While there will be some who will rise to eminence in this field, a large proportion of the labor must be done by the more modest workers. As America is first in much that pertains to progress in science and art, I am convinced that she will soon lead in the practice of abdominal surgery, and I believe that this period will be reached during the lives of some who are here today. This practice is in its infancy, and as it progresses, we will find as good original thinkers and workers, and as skilful operators as can be found in England, France, Germany or elsewhere.

It is, at the present time, possible for the general surgeon to be a success as a general practitioner in medicine; but whoever attains any great degree of success in abdominal surgery must largely sacrifice all other interests and become a specialist.

In an experience much more limited than that of some of my confreres, personal sacrifices have taught me this, and the study of the professional lives of such men as Atlee, Peaslee, Kimball

and others who are yet living and are earnest workers, impresses me most profoundly that such is the fact.

Many owners of the vast wealth of this country are interested in this branch of our work and in the promotion of all the interests of our profession. Many have already sought to aid us by endowing medical schools and hospitals. Let us encourage the good work, and wherever and whenever we can, consistently, with the dignity of our profession, let us secure such material aid as shall enable us to advance the interests of medical science and contribute to the relief of suffering humanity.

Case 1. The first recorded case of ovariectomy performed by an Albany surgeon, was done in the Albany hospital very soon after its organization, by Alden March, December 10, 1849. The case is reported in the Transactions of the Medical Society, of the State of New York for 1850. It gives some striking points when reviewed at the present time.

The patient recovered, though the first ligature slipped, and about a pint of blood escaped into the peritoneal cavity, which was cleaned out with sponges, after the pedicle had been secured a second time by transfixion. In the report of the case, he speaks of the dangers of adhesions in such cases; also of the operation being in its infancy, and the possibility that surgeons might be tempted to do it too often. This patient was in excellent health three years after the operation. The doctor does not in any of his cases refer to the use of the clamp. In his cases he seems to have worried much in making a diagnosis between solid tumors of the uterus and ovarian multilocular cysts. Table I, gives all of Dr. March's cases as well as the results of other operators.

Case 2 was thought by some of the counsel present to be ascites. Dr. March made a free abdominal incision. No ascites. Tumor multilocular; large sac opened; dark ropy fluid escaped; and from several small cysts, a white, jelly, egg-like looking fluid. Owing to the many and firm adhesions, it was thought best not to attempt removal. Dr. March states the intestines were then returned and incision closed. Patient did well for two or three days, but it is not stated whether she recovered.

Case 3. Dr. March supposed he had an ovarian tumor to deal with, exposed the tumor, thrust in his trochar, but to his great disappointment, got only blood, and then discovered that it was a vascular

fibroid; the bleeding was very free, incision in abdomen was closed, and patient died in forty-two hours.

Case 4 was tapped first March, 1857, and 21 pounds of a brownish ropy fluid removed. Second tapping done in May, with similar results. Third tapping in the beginning of July. August 26, 4th tapping, 25 lbs., removed, and then an injection of 8 oz. alcoholic tr. iodine was injected into the empty sac. Many adhesions were found on exposing the cyst, thought to be due somewhat to the use of the iodine. On account of the vascular condition of the adhesions and their great extent, it was thought best not to go on with the attempt to remove the tumor. A seton was put in the walls of the cyst (a portion of which was removed), and brought out of the lower end of incision. The latter was closed by interrupted sutures. In the operation, chloroform and ether were used. Adhesive straps, compresses and bandage. When the injection of iodine was made use of, Dr. Thomas Hun placed in the mouth of the patient a thin slice of potato which showed evidence of iodine absorption in about fifteen minutes.

Case 5, as Dr. March states, was really an exploratory incision to determine the nature of the growth, it having been diagnosed ovarian in New York. Doctor M. thought otherwise. Was found to be a very solid vascular fibroid from fundus of the uterus. Fluid was peritoneal dropsy. Incision closed, and patient died in twenty-four hours. Was much emaciated and exhausted before the operation was commenced.

Case 6, see table.

Case 7, was a very creditable operation. No sponges used in peritoneal cavity. No severe loss of blood. Wound closed by interrupted sutures. Patient died on the third or fourth day from peritonitis.

So far as I am able to learn from his notes, and the hospital records Dr. March did abdominal section seven times. As stated, his first case was a complete success. His careful study of cases as to diagnosis and proper selection as to the time and method of operating, and line of treatment, impresses one very profoundly. Dr. March was an intensely honest man and an expert in palpation, and yet he does not hesitate to report his experience in tapping a fibroid for an ovarian cyst, the case afterwards passing into the hands of Dr. Atlee for an exploratory incision, from which the patient recovered.

It was no reflection upon him, however, that he was not aware of the importance of cleanliness of sponges, instru-

ments, etc., and by reason of the pathology and want of knowledge in his day of such cases, that he did not make his work a success. He did much, however, to advance the operation, and often stated that he had no doubt but that in time it would become a successful and established step in surgery.

Case 8. Dr. S. H. Freeman, of this city, tells me that Dr. W. F. Atlee, of Philadelphia, operated some time in 1850, in Montgomery street, and that he was assisted by Dr. March; that at the time, the operation attracted great attention both from the profession and the public. The patient, however, did not recover.

Case 9. The next to follow in doing the operation was Dr. J. V. P. Quackenbush, who operated successfully at a private house in Gloversville, N. Y., August 3, 1869, and he was greatly rejoiced in seeing his patient recover. The doctor's only anxiety seemed to be in keeping the bowels from moving, in which he succeeded by the use of opium, the first movement taking place the thirteenth day after operation.

Case 10. Dr. Quackenbush probably performed the first Cæsarean section done in Albany. The case is reported at length in the *Transactions of the Medical Society, of the County of Albany*, vol. iii, p. 30.

Case 11. This next case was unsuccessful, and discouraged him greatly, and is now reported for the first. He was well up in the manner of making a diagnosis and method of doing the operation. Yet, it is on record, that he mistook an ovarian case for one of pregnancy, and this worried him.

Cases 12, 13, 14 and 15. Dr. E. R. Peaslee, while professor in the Albany Medical College, was the operator. He operated in the amphitheatre of the Albany Hospital in two cases, and upon one in a private room, all of whom died; two from peritonitis, and one from immediate hemorrhage. Dr. S. H. Freeman informs me that Dr. Peaslee operated on a private patient (at her house) of the late Dr. J. V. Lansing in the fall of 1871, and that the patient recovered. These cases are reported for the first time in my tabulation. He used the silk ligature in each case, and dropped the pedicle back. I have seen many operators, but never one so careful and painstaking as Dr. Peaslee, and had he had the advantages offered today in antiseptic surgery, he would have been the "Tait" of America in his successful work.

Dr. Peaslee's third case was such, that, had it occurred at the present time, seeing our patient sinking so surely, we would not have hesitated to open up and see, or find the trouble.

Case 16. Dr. Lewis Balch, Prof. of Anatomy in the Albany Medical College, was the next successful operator. He operated at St. Peter's Hospital November 28, 1876, and the patient recovered. The only unusual feature of this case was the character of the fluid, consisting of a very viscid liquid in which were suspended a large number of pea-shaped bodies made up of sebaceous matter. Dr. Mundé in a recent article (*Amer. Jour. of Obst., etc.*), describes four similar cases.

Case 17. Recorded by Dr. S. B. Ward in *Albany Medical Annals*, vol. iii, p. 327, is very remarkable and notes are given in full. Mr. T. B. æt. 38, inmate of the penitentiary, on 30 years' sentence for counterfeiting, on July 10, with suicidal intent, cut his abdomen, tried to divide the right carotid, and then severed the left brachial artery an inch above the elbow. He did this in his cell at night, and was not discovered until next morning. Dr. H. R. Haskins, surgeon to the penitentiary, found him exsanguinated to the last degree, with no pulse at the left wrist and very little at the right. There was a wound one and one-quarter inches long over the left brachial, but the artery was not in sight; one in the abdomen several inches long, extending from a little to the left of the umbilicus to the ensiform cartilage, through which protruded the stomach, large and small intestines, with omentum, which was gashed in several places and a distinct amount of fecal matter was on the skin, the viscera having been further cut after protrusion. The intestines were cold and dry, somewhat adherent, and had fuzz from the blanket sticking to them. Being apparently moribund, the parts were wiped with a dry handkerchief, and after an hour returned, immediate attempt causing hiccough and severe pain, and the wound closed with eight sutures, not through the peritoneum, broad bands of plaster being applied around the trunk. The other wounds, bleeding having ceased, were brought together with plaster only. He was kept steadily under the influence of morphia, and after forty-eight hours was removed to the prison hospital. For four days he did not raise his head or move hand or foot. At the end of that time sutures were removed, the wounds having nearly healed by first intention, about an inch of abdominal wound being still open, but healed at the bottom, when I saw him, Dr. Ward states, July 27, by the kindness of Dr. Haskins, who gave me permission to use the history of the case. This has gradually filled by granulation. He has had very little pain and no evidence of peritonitis at any time. The tongue has been clean, the pulse always below 100, and the temperature never notably above normal. Morphia was discontinued on the eleventh day, and the bowels moved voluntarily on the fourteenth.

A firm cylindrical mass occupied the place of the brachial artery where it is wounded, two inches above pulsation being felt. Pulsation is perfectly plain in the left radial showing that collateral circulation is established. He was returned to duty November 1. The knife used was one he had made from the steel spring which goes in the shank of a lady's gaiter, its blade three-eighths of an inch wide, two inches long, thick, pointed, and well ground. Suicide was probably attempted under an insane delusion.

Death would probably occur in such a case from hemorrhage, shock or peritonitis. The completeness of division of the brachial, with a possible bending of the elbow, checked the hemorrhage; the warmth of the weather, with covering of the blanket, prevented shock from cold; as to peritonitis, the intestinal wounds being inflicted after protrusion, no fecal matter probably entered the peritoneum, and from long exposure, all oozing had ceased before their return, the wounds being already closed by exudation begun, but the greatest factor in preventing peritonitis was the copious bleeding.

About one year after his recovery, Mr. T. B., again attempted suicide by cutting his throat. I was called to see him in consultation with Dr. W. H. Murray, physician to the penitentiary, and found that he had used very much the same kind of a knife as in the former attempt, with one in each hand had cut both ways, severing completely the trachea, and cutting into the œsophagus, and had bled very freely from the cut superior thyroids which I at once ligated. I closed the wound in the œsophagus with fine silk sutures, and the trachea with silver wire, bringing the external soft parts carefully together, securing good drainage. He made a rapid and excellent recovery, and continued to do his work in a faithful and careful manner. He was pardoned by President Cleveland June 30, 1887, his time of service having been shortened by his good behavior. He was in excellent condition of health, his former wounds giving him no trouble whatever. The theory of his case always was that he had been unjustly imprisoned, there being no law against making steel plates for engraving, for which he was paid.

Case 18. Was the case of Dr. LeRoy McLean, of incision into the bladder, so ably reported in the *Medical Record*. vol. 15. p. 126, 1879.

Case 19. An exploratory incision, by Dr. S. B. Ward, May 13, 1880. The adhesions were so severe that it was found impossible to remove the tumor. The incision was closed. She made a good recovery from operation, but finally died from exhaustion June 20, 1880. The history of this case does not state as to her having been tapped before the operation. Tumor was multilocular.

Case 20. Operation by Mr. Tait Sept. 10, 1884. This is a remarkable case. Reported in full in *Albany Medical Annals*, vol. 6, p. 1.

The operation was for ovarian tumor and uterine myoma, both of which were removed. The pedicle was treated by Tait's circular wire clamp. It was found after the operation that a portion of the bladder wall had been included with the pedicle by the clamp, and vesical fistula followed.

On the 30 of November, 1884, the fistula was entirely healed, and the patient had perfect control of the bladder. Examination of the bladder revealed a firm cicatrix extending from near the umbilicus to the symphysis pubis, and no trace of the fistula could be discovered.

May 1, 1887, the patient called at my office for examination. I found that she had been in excellent health since her recovery, but that, for the past year, she had been developing a hernia from the lower point of the cicatrix as large as my fist. I ordered her a truss which has given complete satisfaction.

Case 21. Operated on by Mr. Tait for the removal of uterine appendages, is reported at length in *Albany Medical Annals*, vol. 5, p. 6, and again as to further result by myself in the *American Journal of Obstetrics*, May, 1887.

Case 22. Is a successful recovery from ovariectomy by Dr. Franklin Townsend, Jr., and reported fully in *Medical Annals*, vol. vi. p. 342.

Case 23. Operated on April 10, 1887, by Doctors Fisk and Morrill. Miss. S., aged 23 years, married eight years; no children. Noticed small swelling about four years ago, gradually increasing up to date. No trouble with menses till April, 1887, then had pain, color very pale. The large cyst was connected with left ovary. Right ovary inflamed and slightly enlarged. After preparing patient, operation was performed. Drs. Fisk, Morrill, Classen and Willard present. Straight incision from umbilicus to pubes, four inches in length. Some adhesions found. Three pints of fluid removed by aspirator. Another small cyst of broad ligament found and removed. The pedicle was two inches broad and one and a half inch thick. Left ovary removed. Patient rallied nicely from operation. Died April 21, from exhaustion.

Case 24. Abdominal section for ovarian cyst. Operation Feb. 2, 1876, by Dr. W. E. Milbanks. Mrs. E. D., aged 61, married, native of the United States, and by occupation a housewife. Family history good, as far as learned. General health good, although suffering at time of operation severely from dyspnoea and dyspepsia, due to distention. On Feb. 2, 1876, abdomen was opened, at Homeopathic Hospital and cyst with contents, weighing forty pounds, removed. Few

7	Mrs. D. P., Smithfields, Mad Co., N. Y.	Alden March. Unknown.	April 18, '68	M	2	1 1/2 yrs	Multilocular adhesions.	few	Left ovary removed; pedicle small, tied and ligatures dropped.* D.	Not reported.
#8										
9	Mrs. E. P., Gloversville, N. Y.	J. V. P. Quackenbush Dr. Brach.	Aug. 3, '69	20 M		23m	Munro cystic ovarian tumor; few adhesions.		Right ovary removed; liga- tured pedicle and dropped.* R	Not reported.
10	Mrs. M., Albany, N. Y.	J. V. P. Quackenbush Dr. Northrop.	Nov. 23, '71	30	1		Deformity pelvic; 1st child.		Casarian section. + D	Med Annals Vol. III, p. 31
11	Mrs. B. K., E., Albany, N. Y.	J. V. P. Quackenbush	Nov. '74.	35 M		1 yr	Ovarian tumor; many adhe- sions.		+ D.	Not reported.
12	Miss M. A. E., Root, N. Y.	E. R. Peaslee. N. L. Snow and Vander Veer.	June 27, '71	18 S	2	1 yr	40 lbs. simple ovarian cyst; very few adhesions.		One ovary removed; silk liga- ture and dropped.* D.	Died in 3 days; peritonitis.
13	Miss B. O'R., Albany, N. Y.	E. R. Peaslee. J. H. Armsby.	Aug. 15, '71	38 S			20 lbs. multilocular.		One ovary removed; silk liga- ture and dropped * D	Died in 4 days; peritonitis.
14	Miss E. McE., Albany, N. Y.	E. R. Peaslee. U. G. Bigelow.	Aug. 21, '71	32 S		1 yr	18 lbs. multilocular.		One ovary removed; silk liga- ture and dropped.* D.	Secondary hemorrhage from being in pedicle which had been twisted during operation in. D. 18 hours.
									* Hospital. + Private house. R. recovered. D. died	

‡ Dr. S. H. Freeman, of this city, tells me that Dr. W. F. Atlee, of Philadelphia, operated sometime in 1850 in Montgomery street, and he was assisted by Dr. March; that at the time the operation attracted great attention, both from the profession and the public. The patient, however, did not recover.

21	Miss B. Albany, N. Y.	Lawson Tait. Dr. Boyd.	Sept. 11, '84	33	S	19 y	Cystic degeneration ovaries. Convulsion before menstruation.	Both ovaries removed; knot.* R.	Tait Albany Med. Annals Vol. 6, p. 6.	
22	Mrs. K. D., Columbi, Co., N. Y.	Franklin Townsend. Dr. Pruyin.	Oct. 23, '84	31	M	4	6 m	Multilocular ovarian; adhesions right side.	Both ovaries removed; knot.* R.	Tait Albany Med. Annals Vol. 6, p. 342.
23	Mrs. P., Albany, N. Y.	S. Fisk & F. D. Morrill F. D. Morrill.	April 10, '87	23	M	4	ys	Ovarian cyst, left ovary.	Left ovary removed; ligated pedicle and dropped.* D.	Not reported.
24	Mrs. E. D., Greenbush.	S. Fisk & F. D. Morrill W. E. Millbanks.	Feb. 26, '76	61	M	7	ys	Ovarian cyst.	Removal cyst and ovary.* D	Not reported.
										* Hospital. + Private house. R recovered. D died.

* Dr. S. H. Freeman informs me that Dr. Feaslee operated on a patient (at her home) of the late Dr. J. V. Lansing's in the fall of 1871, and that the patient recovered.

adhesions. Pedicle treated by clamp. Drainage introduced and wound closed. Patient went on very well until morning of third day, when abdomen became tympanitic and temperature rose to 102° F. Abdominal cavity was washed out and temperature fell to 100.5°, F., but tympanites continued and considerable tenderness developed. Patient gradually sank and died on the fifth day. No autopsy.

About 1870 I began to give much thought to the subject of ovarian tumors and the best method of operating. In my post-mortem work, I had had an opportunity of doing the operation three times upon women who had died of this disease. One was a case of dermoid cyst. One had been tapped a number of times, and presented many adhesions which afforded me a source of much study later on. One other case gave me a chance to enucleate the tumor after Dr. Miner's method.

In 1874 and 1875, I had the good fortune to see Sir Spencer Wells operate in a number of cases; also, through the great kindness of Mr. Knowlesly Thornton, I was granted the privilege of seeing the former, as well as his own cases under after treatment. I shall always remember the awe and care with which we used to enter the rooms of these patients after the operation at the Samaritan Hospital, and what a fight was being constantly made to keep down the high temperature of most of them. At the time of which I speak, Mr. Thornton was just beginning, and I can assure you, gentlemen, he was a greatly discouraged man. Some four or five of his first cases in succession proved fatal, and it required at one time a good deal of encouragement from Mr. Wells to induce him to go ahead. How great the contrast with his present splendid record.

My first case for operation (excluding the ones turned over to Dr. Peaslee, and who had either been sent or came to me for operation) was now offered by my friend Dr. Beach, of Gloversville. It was the case of Mrs. H. S., aged 65, having a large tumor of several years growth. I operated in a poor forlorn wooden house, with the worst possible surroundings.

The tumor, when removed, weighed eighty-six pounds. The patient we judged not quite so much.

Between this time, August 14, 1877, and October, 1878, I did six operations under various favorable and unfavorable surroundings, all at private dwellings.

Cases 2, 3 and 6 were like the first done at private houses and under very unfavorable conditions. In cases four and five, I did my utmost to carry out Listerism in such a way as to make success assured.

Case 5, is, I believe now, the first death reported in this country from carbolic acid poisoning.

Cases 1, 3 and 6 were feeble women and exceedingly unfortunate subjects for operations.

I had now done six sections, or rather complete operations without a success. I had practiced every method, and exercised every care known to me to bring success. Three of these cases were favorable for operation and it seemed to me ought to have recovered.

Is it astonishing that I was greatly discouraged, and about determined to give up my abdominal work. My wife and friends tried to comfort and encourage me. My enemies were doing their best to destroy my reputation, not only in this line of work, but in my general surgical operations. These cases had been sent to me from various points throughout the state, and opportunities were being offered me which I hoped would prove successful.

About this time, one of my patients, now living in New York, consulted me regarding her mother, a resident of Albany, whom I was treating for ovarian tumor. I told her that, in view of the weak condition and feeble family history of the patient I did not think the case a good one for an operation. She concluded to take her mother to New York, and Dr. J. Marion Sims thought best to operate, and the patient recovered. I must say frankly that my surgical pride was greatly touched in the good result following Dr. Sims' skill.

Soon after this, cases seven and eight, both of them wretched

ones for operation, came under my care. One of them had been refused by Dr. T. G. Thomas, when presented for operation. Surgical ambition and friends advised me to try again.

I did so, and they both died, and would, I am sure, under any method of treatment, at the present time.

New cases were sent me, notwithstanding my wretched failures. I temporized with some, tapping in only one instance, although I well remember that both Mr. Wells and Dr. Peaslee at this time advised one tapping to clear very thoroughly the diagnosis, and then, you all remember how much effort was made by examination of fluid obtained, to tell the nature of the growth, etc., etc. Some cases were sent to other operators, but I was not happy. My friends failed not in offering consolation. My patients were not unwilling at any time to trust to my skill. Each of my patients had lived long enough to give me great hope of their recovery. What was I to do?

I had read carefully the results of many others in this field of surgery, and from all that I could glean, I was impressed that the most advanced and successful worker was Mr. Lawson Tait, of Birmingham, and thither I went in the spring of 1884. The first results of that trip I embodied in a short paper, entitled, "Some Personal Observations on the work of Mr. Lawson Tait, F.R.C.S.," read before the Medical Society of the state of New York, February, 1884, and published in the *American Journal of Obstetrics*, Vol. XVIII, No. 7, 1885.

As I studied Mr. Tait's method, I gained impressions, and learned points, for which I must say I am profoundly grateful. Nor does increase of years, or the study of other men's ways and works change my views. Mr. Tait's fearless way of operating imparts confidence to any looker on. Then too, his frank manner of conversing relative to the patients he has on hand and under your own observation gives one great instruction. Then let me say candidly that I never have seen any operator perform the toilet of the peritoneum so carefully as he. Though he works rapidly, yet, he never forgets or neglects anything. I have yet failed to see any manner of securing the pedicle equal to his Staffordshire knot. Then, who does more

thoroughly the washing of the peritoneal cavity, when required, than he. The simplicity of his way of making and completing an abdominal section charmed me from the beginning to the end. I returned to my field of work determined to try again in the direction in which my ambition led.

I had then prepared in the Albany Hospital two rooms as previously described, and on October 14, 1884, did my first successful case of ovariectomy.

Table No. 1, comprises all the operations done by other operators than myself, since the first operation, December, 10, 1849 up to April 10, 1887. I am quite positive that the list is complete and correct. In this table there have been of complete ovariectomies 17, with ten deaths and seven recoveries, exploratory incisions, (the latter including Dr. Quackenbush's case of Cæsarean section, and Tom Ballard's suicidal section), with three deaths and three recoveries, and one case doubtful as to the result.

In connection with this table, the study of the report in full of the cases is worthy of consideration.

In table No. 2, I have tabulated all my own cases. It will be observed that there have been 26 ovariectomies, with nine deaths, and 17 recoveries. Removal of uterine appendages, 8 cases, 7 recoveries and one death. Exploratory incisions, 17 with 8 deaths and 9 recoveries.

It will be observed that my fearfully unfortunate cases in the beginning of my work has told sadly against my percentage as a whole. Yet of my last 18 cases of ovarian cysts there have been 18 recoveries and but one death and that complicated with cancer.

TABLE II.—ABDOMINAL SECTION.

No.	Name and Residence.	Medical Attendant.	Date.	Age. Married or Single.	No. of Children.	No. of Tappings.	Time Since First Noticed.	Disease.	Operation.	Remarks.
1	Mrs. H. S. Gloversville, N. Y.	Dr. Beach.	Aug. 14, '77	65 M	6		3 yrs	Large multilocular ovarian cyst, 86 lbs.; few adhesions.	One ovary removed; silk ligature to pedicle and dropped. + D.	Not reported.
2	Mrs. V. K. F. Albany, N. J.	Dr. Perry.	Nov. 4, '77	29 M			9 m	Multilocular ovarian, 18 lbs.; few adhesions.	Right ovary removed; silk ligature after Peaslee. ⁺ D.	Not reported.
3	Mrs. E. L. Albany, N. Y.	Dr. Murray.	Nov. 15, '77	26 M	1		18 m	Multilocular ovarian, 40 lbs.; very many adhesions.	One ovary removed; silk ligature and dropped; pedicle very short. ⁺ D.	Not reported.
4	Miss B. Chatham Centre, N. Y.	Dr. Collier.	Nov. 27, '77	22 S			1 yr	Multilocular ovarian cyst, 20 lbs.	One ovary removed; silk ligature and dropped; pedicle very short. ⁺ D.	Died on 19th day from small abscess in lungs.
5	Mrs. G. B. E., Binghamton N. Y.	Dr. Griffin.	Aug. 20, '78	26 M	2	3 1/2 yrs		Multilocular 41 lbs.	One ovary removed; Wells clamp. ⁺ D.	Reported Hospital Gazette, Vol. 6, 1879, p. 371.
6	Mrs. B. K., Sullivan Co., N. Y.	Dr. Winters.	Oct. '78	43 M	3	23 yrs		Multilocular ovarian, 36 lbs.; estimated few adhesions.	One ovary removed; Wells clamp. ⁺ D.	Not reported.
7	Miss S. R. M. Cobleskill N. Y.	Dr. Myers.	May 26, '80	20 S			5 2 yrs	Multilocular ovarian, 40 lbs.; many adhesions.	Right ovary; silk ligature after Peaslee. ⁶ D.	Not reported.

8	Mrs. M. J. S. Kingston, N.Y.	Drs. Schoonmaker and Smith.	Aug. 6 '83.	45	M	7	1	4	½	Large multilocular, 58 lbs.; adhesions very many and firm in cavity of pelvis.	Silk ligature after Peaslee and Not reported.
9	Mrs. A. W., Worcester, N. Y.	Dr. Vander Veer.	Oct. 15, '84.	32	M	1	1	3	½	Unilocular ovarian cyst, 36 lbs.	Both ovaries removed; knot.* R. Tait Reported Am. Jour. Obs. No. 7, 1885.
10	Mrs. E. J., Whitehall, N. Y.	Dr. Holcomb.	Nov. 6, '84.	62	M	1	1	yr	Unilocular ovarian cyst, 25 lbs.	Both ovaries removed; knot.* R. Tait Do.	
11	Mrs. C. A., Slingerlands, N. Y.	Dr. D. C. Case.	Nov. 21, '84.	34	M	1	1	yr	Double Hydro-Salpinx.	Both ovaries removed and appendages; Tait knot. Do.	
12	Miss J. H., West Troy, N. Y.	Dr. Van Vrauken.	Nov. 28, '84.	56	S	12	12	yr	Uterine fibroid; severe hemorrhage.	Unsuccessful attempt to remove appendages.* R. Do.	
13	Mrs. J. G. R. Albany, N. Y.	Dr. Vander Veer.	Jan. 8, '85.	43	S	3	10	yr	Severe hemorrhage and ovarian pain.	Unsuccessful attempt to remove appendages.* D. Do.	
14	Miss M. F. Ballston, N. Y.	Dr. J. DeZouchee.	April 2, '85.	50	S	7	7	ys	Multilocular ovarian cyst, 41 lbs.	Both ovaries removed; knot.* R. Tait Not reported.	
15	Mrs. J. L., Schenectady, N. Y.	Drs. Hull & Faust.	April 3, '85.	18	M	5	21	m	Unilocular ovarian cyst with disease, 15 lbs.	Both ovaries removed; knot.* R. Tait Not reported.	
16	Miss L. C. Albany, N. Y.	Dr. Freeman.	April 21, '85.	45	S	1	1	yr	Unilocular ovarian cyst with disease, 15 lbs.	Both ovaries removed; knot.* D. Tait Not reported.	
											* Hospital. + Private house. R recovered. D. died.

* Hospital. † Private house.
R recovered. D. died.

TABLE II.—CONTINUED.

No.	Name and Residence.	Medical Attendant.	Date.	Age. Married or Single.	No. of Children.	No. Tappings.	Time Since First Noticed.	Disease.	Operation.	Remarks.
17	Mrs. M. H., Binghamton, N. Y.	Dr. Booth.	June 11, '85	33 M			3 ys	Soft ovarian cyst; severe hem- orrhage.	Unsuccessful attempt to re- move appendages.* D.	Not reported.
18	Miss B. C., Knox, N. Y.	Dr. Vander Veer	Sept. 21, '85	28 S			14 y	Cyst left broad ligaments.	Removed right ovary and tube; Tait knot.* R.	Not reported; death from peritonitis on fifth day
19	Mrs. E. L., Watervliet, N. Y.	Dr. Lothridge.	Feb. 19, '86.	30 M	3		1 yr	Unilocular ovarian cyst; 27 lbs.	Both ovaries removed; Tait knot.* R.	Not reported.
20	Miss F. C., Albany, N. Y.	Dr. Boyd.	Mar. 25, '86	26 S			11m	Unilocular ovarian cyst; 17 lbs.	Both ovaries removed.* R.	Not reported.
21	Mrs. J., Worcester, N. Y.	Dr. Leonard.	May 17, '86.	47 M			5 m	Multilocular ovarian cyst 20 lbs.	One ovary right removed.* R.	Not reported.
22	Miss H. I. C. Hudson, N. Y.		May 26, '86.	27 S			3 ys	Simple ovarian cyst, 23 lbs.	One ovary right removed.* R.	Not reported.
23	Miss M. P., Albany, N. Y.	Dr. La Moure.	May '86	24 S			10 y	Dysmenorrhea with epileptic convulsions.	Both ovaries and appendages removed; Tait knot.* R.	Reported in Am. Jour. Obs. May 1887.

24	Mrs. B. T., Chester, N. Y.	Dr. Mallory.	Oct. 1, '86	42	M	18 ys	Fibrocystic tumor uterus.	Hysterectomy; tumor large; Tait clamp.* D.	Not reported.
25	Miss M. C., Rensselaerville, N. Y.	Dr. Lanehart.	Oct. 6, '86	19	S	5 ys	Dysmenorrhea and epilepsy.	Uterine appendages; knot.* R.	Tait Reported in Am. Jour. Obs. May 1887.
26	Mrs. A. M. G. Albany, N. Y.	Dr. Vander Veer.	Oct. 13, '86	62	M	9 m	Unilocular, 37 lbs.	Right ovary; Tait knot.* R.	Not reported.
27	Mrs. S. M., Constock, N. Y.	Dr. Vander Veer.	Oct. 21, '86	26	M	1 yr	Unilocular, 13 lbs.	Both ovaries; Tait knot.* R.	Not reported.
28	Miss M. O'C., E. Albany, N. Y.	Dr. Vander Veer.	Oct. 28, '86	42	S	5 ys	Fibroma from left horn uterus	Removed; pedicle secured by ligature and dropped.* D.	Many and strong adhesions to small intestines.
29	Miss E. B., Scheneectady, N. Y.	Drs. Fuller and Ellwood	Nov. 18, '86	18	S	7 m	Tuberculosis of peritoneum	Exploratory incision.* R.	Not reported; cure.
30	Miss K. S., Gloversville, N. Y.	Dr. Beach.	Jan. 13, '86	33	S	18 y	Hystero-epilepsy, dislocation and pain in left ovary; cystic degeneration.	Removal appendages, both sides; Tait knot.* R.	Reported Am. Jour. Obst. May 1887.
31	Mrs. E. R., Pittsfield, Mass	Dr. Winship.	20, '87	49	M	2 ys	Supposed either ovarian or fibro cystic; was solid tumor right ovary.	Enucleation; many ligatures to vessels.* D.	Not reported.

* Hospital. + Private house.
R recovered. D died.

TABLE II.—CONTINUED.

No.	Name and Residence.	Medical Attendant.	Date.	Age. Married or Single.	No. of Children.	No. of Tapings.	Time Since First Noticed.	Disease.	Operation.	Remarks.
32	Miss A. P. Argyle, N. Y.	Dr. Still.	Feb. 4, '87	35	S		9 ys	Bleeding fibroid.	Unsuccessful attempt to remove appendages.* R.	Reported in Am. Jour. Obs. May 1887. Patient improved.
33	Mrs. M. K., W. St. Bridge Mass.	Dr. Race.	Feb. 10, '87.	70	M	6	3 16m	Multilocular, 42 lbs.	Removed both ovaries; Tait knot.* R.	Not reported.
34	Mrs. M. D. Albany, N. Y.	Dr. Milbanks.	Feb. 11, '87	54	M		4 ys	Fibromawith multilocular ovarian cyst.	Exploratory incision; sac fastened to incision and drained + R.	Not reported; patient died in five weeks from symptoms meningitis.
35	Miss M. L., Albany, N. Y.	Dr. Vander Veer.	Feb. 17, '87	10	S		8 m	Tuberculosis peritoneum.	Exploratory incision.* R.	Not reported; patient died later; tubercular pneumonia.
36	Mrs. A. B., Albany, N. Y.	Dr. Vander Veer.	Feb. 25, '87	33	M	1	18m	Double salpingo-oophoritis.	Removed left ovary and tube; Tait knot.* R.	Not reported; right ovary cinched and so adherent could not remove.
37	Mrs. S. J., Albany, N. Y.	Dr. Bigelow.	Mar. 11, '87	33	M	3	5 ys	Multilocular ovarian cyst, 12 lbs.	One ovary; Tait knot.* R.	Not reported.
38	Miss D. D., Albany, N. Y.	Drs. Boyd, Lewis and Vander Veer.	Mar 15, '87	38	S		3 ys	Fibroma and peritoneal dropsy	Exploratory incision* R.	Not reported.

39	Miss M. Albany, N. Y.	Dr. Bigelow.	Apr. 21, '87/25	S	9 m	Unilocular cyst 13 lbs.	Both ovaries removed; knot.* R.	Tait Not incision.	Sinus from
40	Mrs. M C. H. Albany, N. Y.	Dr. Vander Veer.	Apr. 28, '87/47	M	22 m	Unilocular cyst 20 lbs; some adhesions.	Right ovary removed; knot.* R.	Tait Not reported.	
41	Miss L. H., Cobleskill.	Dr. L. Cross.	Sept. 17, '87/42	M	4	Multilocular ovarian cyst, 35 lbs	Removal cyst and ovary.* R.	Adhesions slight; not reported.	
42	Mrs. J W.,	Dr. Whitcomb, Greenwich, N. Y.	Sept. 19, '87/55	S	2 ys	Ovarian cyst, 15 lbs.	Removal cyst and ovary.* R.	No adhesions; not reported.	
43	Miss B. D. B. Ballston, Ga.	Dr. Lawrence, Ballston, Ga.	Oct. 3, '87/20	S	5 ys	Renal cyst.	Removal right kidney and cyst.* R.	Reported N. Y. Med Journal.	
44	Mrs. F. O., Kishaton, N. Y.	Dr. Seldon, Catskill, N. Y.	Oct. 7, '87/43	M	4 ys	Suppurating ovarian cyst.	Sac adherent, tapped and sutured to abdominal wall.* R.	Not reported elsewhere.	
45	Miss E. C. W., Kunselaerville, N. Y.	Dr. Mueller.	Oct. 10, '87/34	M	1 m	Two fibrous and soft myxoma?	Exploratory; nothing done.* R.	Not reported.	
46	Miss F. E. H. Ballston		Oct. 17, '87/46	S	12 y	Chronic intestinal obstruction	Exploratory; relieved constricting bands.* R.	Not reported.	
47	Miss L. J. L., Schenectady, N. Y.	Dr. Pierson.	Oct. 28, '87/45	S	6 ys	Uterine fibroid.	Tubes and ovaries removed.* R.	Not reported elsewhere.	

* Hospital. † Private house, R recovered. D died.

TABLE II.—CONTINUED.

No.	Name and Residence.	Medical Attendant.	Date.	Age, Married or Single.	No. of Children.	No. Tapping.	Time Since First Noticed.	Disease.	Operation.	Remarks.
48	Mrs. D. R.	Dr. Bassett.	Oct. 31, '87	58 M	1		4 ys	Colloid cancer of ovary.	Growth removed.* D.	Death third day from exhaustion and peritonitis.
49	Mrs. M. J. O.	Dr. F. Elwood.	Nov. 13, '87	40 M	1		8 ys	Uterine fibroid.	Removal of tubes and ovaries * D.	Death on third day from peritonitis.
50	Miss M. R., Fair Haven, N. Y.	Dr. J. H. Reilly.	Nov. 15, '87	35 M	2		5 ys	Hemato-salpingitis.	Both tubes and drains removed.* R.	Not reported.
51	Mr. S. V. V., Amsterdam, N. Y.	Dr. E. T. Rulison.	Dec. 2, '87	22 S			6 ds	Acute intestinal obstruction.	Removal of Meckel's diverticulum; division of bands.* D.	Death from heart-failure on third day.
									* Hospital + Private house. R recovered D died.	

Of the cases tabulated in table No. 2, the following have been selected as having some unusual and interesting features.

Case 24. Mrs. B. T., æt. 42, married; admitted to Albany Hospital Sept. 16, 1886. Married 22 years. Became pregnant 17 years ago but aborted. Has never been pregnant since. She has menstruated once in three weeks; used to be attended with a good deal of pain before menstruation and for several days after. Eight years ago noted the appearance of a tumor or lump in the right ovarian region. There used to be an almost constant pain and soreness on that side. Would get up feeling well in the morning but during afternoon would suffer so much as to be obliged to lie down. As tumor increased in size she noticed pain was less severe. Tumor had of late increased in size very rapidly and oppressed her very much, causing difficulty in respiration. At times appetite was very poor; she was otherwise healthy and of a cheerful hopeful disposition. Diagnosis, fibro-cystic tumor of uterus. Operation hysterectomy, done 12 M., Oct. 1, was over two hours duration owing to the great number of adhesions and hemorrhage; Tait clamp used; glass drainage tube. She recovered very well and was cheerful, but gradually sank and died at the end of 48 hours. Had this patient been operated on early she would certainly have recovered with her splendid courage.

Case 29. Miss E. B., æt. 18, admitted to Albany Hospital Nov. 17, 1886; discharged Dec. 1, 1886, improved. Patient says that she has always been healthy until last April, when she noticed an enlargement of the abdomen. She had some pain in back of dull heavy character. Lost appetite, but her bowels were regular; no trouble in passing urine. She menstruated at 14 years of age and has been regular ever since except one time last summer, when she went two months over her time. Last two periods have been regular. Tumor seemed to enlarge for a time and then diminish, but for the last two months enlarged very rapidly. Abdominal section was performed Nov. 18, 1886. The abdominal cavity was completely filled with an ascitic fluid and a tuberculous growth of left ovary discovered; the omentum and peritoneum are covered with tubercular points or cones. Her mother died of phthisis while the patient was in the hospital. After exploration, incision was closed and patient recovered rapidly. She was not told as to a tumor having been removed until six months after, when she was greatly surprised. There was no return of the dropsy and she has continued in excellent health in every respect.

Case 33. Abdominal section at West Stockbridge Centre, Mass.,

Feb. 10, 1887. Mrs. M. K., æt. 70, always healthy, mother of six children. Passed menopause normally. Began to enlarge 16 months ago. Had peritonitis a year ago.

Tapped Sept. 30, 1886, 36 lbs, fluid.

" Dec. 10, " 40 "

" Feb. 1, 1887, 22 "

Operation " 10, " 40 "

It was a cyst of the broad ligament of the left side, and appendages of that side were removed with it. Appendages of the right side also removed; slight cystic degeneration. Extensive adhesions and very vascular. Paquelian cautery used on several points. Many were ligatured, but oozing was from so extensive a surface that abdominal walls were brought together in median line overlapping each other, and kept there by pads. Incision closed with nine deep sutures and three superficial ones. Rallied well from operation; highest temperature 101.4° on evening of second day; combatted with aconite and opium mixture, and ice to nape of neck, and ice cloths to forehead; considerable nausea, but no serious vomiting, for which morphine, ice, soda and sinapism were used. Liberation of gas always lessened or relieved nausea; small hypodermics given as indicated. Passed catheter twice after which patient emptied bladder for two days, and was drawn again for the three following days. Gave enema 26 hours after operation, and gas liberated, much to the relief of patient. Gave enema through rectal tube the evening of the second day, and repeated at times, and though passed high up and enema retained for hours, nothing but a trace of feces followed. On fifth day (to allay a threatened vomiting) gave one-fourth grain podophyllin and one-tenth grain calomel, and repeated every six hours until five doses were given, when bowels indicated activity, and moved on the sixth day. Nausea was completely relieved, sutures removed on fourth, fifth and sixth days. A little discharge from incision, but iodoform dressing used, and union took place. On second day commenced the use of quinine as a tonic, and gave pepsin with diet. Gave hot water, iced milk, milk punch, gruel, cracker and hot tea, beef tea, oyster broth and toast. Patient made a good recovery. Has since gone out visiting her friends, some of whom live six and seven miles from her home. Operation was done at patient's house after room had been prepared with great care by Dr. C. H. Race, her family physician.

Case 38. Exploratory abdominal section. Uterine fibroid. Operation March 15, 1887. Miss D. D., æt. 36, single, native of the United States and by occupation a merchant. Family history good. Three

years ago noticed growth in the abdomen, which continued to increase until time of operation. Abdominal incision showed a uterine fibroid, size of a child's head, adherent to viscera and abdominal parietes. The incision was carried above fibroid, and fifty-two pounds of ascitic fluid drawn off. Wound closed without removal of fibroid. Patient recovered from exploration, but abdomen has refilled with fluid many times, and she has been tapped about every two weeks since.

Jan. 19, '88, I inserted a silver drainage tube for permanent drainage.

Case 44. Abdominal section for suppurating ovarian cyst. Operation Oct. 7, 1887. Mrs. F. O., æt. 40, married, native of the United States, and by occupation a housewife. Family history good. Patient has had several attacks of pneumonia, and typhoid fever once. First menstruation at thirteen, last in March, 1887. Mother of two children; both labors uncomplicated. Four years ago tumor first discovered, then the size of child's head, and located on left side. It grew slowly until last June (1887), since which it has increased very rapidly. Patient's bladder very irritable; has rapidly lost flesh and strength. Abdomen very much distended by fluctuating tumor. Hard bodies could be felt upon vaginal examination in the cul de-sac of Douglas.

Operation done in general operating room of hospital, class of Albany Medical College present. Cyst exposed, found adherent but tapped. The fluid (15 pints) was found to be very offensive pus. This patient had never been tapped. The cyst walls were so adherent to the viscera that enucleation was not attempted. The opening into the sac was stitched to the abdominal wound by continuous suture. In closing abdominal wound opening to sac was lost. However, rubber drainage was introduced in superficial wound. Reaction came on very slowly, but after second day patient did well. Temperature never rose above 99.5° F. No pus drained from wound. Cyst slowly refilled and was aspirated Nov. 9, 1887, removing a pint of pus. Patient left hospital the next day and, although knowing her condition, was full of hope, had good appetite and had gained considerable strength. Saw her attending physician, Dr. Seldon, of Catskill, Jan. 23, 1887. He states that he has twice tapped patient during last month, removing in all twenty pints of pus. Incision and permanent drainage, together with washing out, has been urged, but the patient is so unfavorably situated that the suggestion has not been carried out.

Case 45. Exploratory abdominal section. Two fibroids and a supposed soft myoma. Operation Oct. 11, 1887. Mrs. E. C. W., æt. 34, married, native of the United States, and by occupation a housewife.

Family history is decidedly tubercular. Patient never has been strong. First menstruation at 13, scanty and painful. Has suffered from amenorrhea since, at times. No children, no miscarriages. Was treated in 1883 for ulcers of cervix. June 5, 1887, was the date for the return of her menstruation, but no flow appeared. On June 25, 1887, patient noticed a tumor in left iliac region. It has grown rapidly since. On the morning of July 7, patient noticed a slight show. Breasts have become large and tender, areola pigmented. I gave the patient a very careful examination at my office, and was in much doubt as to her condition, taking into full consideration the probability of a normal or extra-uterine pregnancy; also of fibroid or fibro-cystic tumor.

Upon consultation and examination by Drs. Boyd, Townsend and myself, per vaginam a natural cervix could be felt high up and a mass at the left side of the uterus distinctly made out. A sound was introduced and uterus apparently found three inches long. Upon abdominal palpation a hard tumor was found on the left side and a softer one (semi-fluctuant) on the right side. No absolute signs of pregnancy could be obtained. An exploration was decided upon after proper explanation of case to patient, her husband and friends, extra-uterine pregnancy being strongly suspected.

Abdominal incision revealed two very dense fibroids upon the left of the uterus sub-peritoneal in character and the remainder of the uterine tissue, especially upon the right side, seemed involved in a soft myoma. Adhesions were very general. No further operation being advisable, abdomen was closed.

Patient went on well until fifth day when some localized peritonitis developed and rapidly became general. On evening of sixth day abdominal wound opened in consequence of great distention of bowels due in part to peritonitis and obstructive pressure of fibroids. A large dressing was saturated with serous effusion. Wound was brought together by strapping. Next morning drainage was introduced. Peritonitis subsided in a day or two, and case went on to recovery. Discharged from hospital November 8, 1887. Abdominal wound completely healed. November 13 I visited her at a friend's home on Madison avenue, and found her presenting a very good condition of health. Able to move about house and cheerful. Advised the use of electricity, and requested her to let us know later on how she progressed.

December 24, Dr. H. F. C. Mueller, of Rensselaerville, visited me, and stated that he had been called to attend Mrs. W. a few days previous. Arriving at her house he found her partially delivered of a

six months foetus. The doctor delivered the placenta. Noticed quite an enlargement of the abdomen remaining. He also stated that she was then (December 24) doing well.

Case 46. Exploratory abdominal section. Stricture of descending colon. Operation October 17, 1887. Miss F. E. H., aged 46, single, native of United States, and by occupation a dressmaker. Family history good. When fifteen years old had severe attack of dysentery, following later by general peritonitis, since which she has suffered, more or less, from abdominal pain and difficult defecation.

For last twelve years has only been able to secure movement of bowels by use of very large enemata. The stools were not formed and contained much mucus and blood. Upon physical examination a tumor could be found about the size of an apple just above Poupart's ligament on the left side. The uterus seemed free from growth. No stricture of rectum could be found. The abdomen was opened, and what appeared to be the tumor was found to be a dilated portion of the descending colon bound down to the iliac fossa by adhesive bands. These bands were loosened up and colon released. Where the constricting bands had been thrown across the colon there was considerable narrowing of the lumen of the bowel, due to cicatricial tissue. It was decided to do neither a colotomy nor a resection at this time, and the wound was closed. Patient recovered from operation nicely, and November 5, 1887, went back to private room under care of general nurse.

The obstruction to bowel was very greatly relieved. Patient now passes well formed motions with little discomfort and without use of laxatives or enemata.

Case 47. Abdominal section Removal of tubes and ovaries for relief of uterine fibroid. Operation October 28, 1887. Recovery. Miss S. J. S., aged 45, colored, single, native of the United States and by occupation a cook. Patient was of the tubercular diathesis; a sister has a uterine fibroid. Previous health good. Menstruation normal until beginning of present trouble six years ago. At that time a diagnosis of fibroid was made and she was treated by ergot subcutaneously with considerable improvement. During spring of 1887 hemorrhage returned with great violence, being practically continuous. She was confined to her bed nearly all the time. Electricity externally and per vaginam was faithfully tried without benefit. The usual medicinal treatment was also tried without palliation of trouble.

Finally, the removal of tubes and ovaries, or a hysterectomy, was determined upon. Abdominal incision was made; tumor which was

very large and adherent had no pedicle that could be reached. Tubes and ovaries were removed, ligated by Tait knot. Considerable trouble was experienced in closing the wound on account of very thick and fat abdominal walls. Two rows of sutures were introduced. She flowed for forty-eight hours after operation quite severely; there has been no return since.

The abdominal wounds gave a great deal of trouble, the borders sloughing freely, multiple abscesses formed about stitch-holes, convalescence was very protracted, but she finally left hospital January 18, 1888, feeling well and with none of her old symptoms. Tumor has apparently shrunk some already.

Case 48. Exploratory abdominal section. Carcinoma colloid. Operation October 31, 1887. Mrs. D. R., aged 58, married, native of the United States, and by occupation a housewife. Patient's mother died of cancer; a sister from phthisis. She has never been strong; had one child; one miscarriage. Menstruation dysmenorrheal; first at 16, menopause at 47.

Over four years ago was told by her family physician that she had an ovarian cyst. I saw case two years ago and then could make out a well defined growth of right ovary which was regarded by me at that time as cancerous. It continued to grow slowly until two months prior to operation, since which it has increased rapidly. Has suffered much from abdominal pain of late, together with nausea.

The abdomen was filled with large, apparently, fluctuating tumors, irregular in shape, abdomen had domé-like appearance, upon percussion general dulness save in the lumbar region. A diagnosis of probable ovarian cyst was made.

Abdomen was opened, short incision, and as peritoneum was incised a yellow gelatinous material oozed out. Incision rapidly enlarged and ten pints of some material removed together with a considerable mass which was ligated and removed. Abdomen was flushed with warm water by syphon. Wound closed. Drainage—glass tube—introduced.

Patient reacted slowly, but became entirely conscious. She exhibited no courage after operation. On second day signs of peritonitis developed, and patient gradually sank, and died the third day after operation.

Autopsy held eight hours later. Peritoneum congested and covered with lymph. Nearly a quart of fluid in pelvis together with fragments of growth. Liver, stomach and kidneys normal. No further examination made.

Case 50. Abdominal section for removal of tubes and ovaries in hæmato-salpinx. Operation November 15, 1887. Mrs. M. R., aged 35, married, native of England, and by occupation a housewife. Patient has the tubercular diathesis. Family history otherwise good. Previous health good. Menstruation normal until beginning of present illness. Mother of two children. One miscarriage five years ago, from which illness dates. After miscarriage suffered from fever, severe pelvic pain, menorrhagia, metrorrhagia, and has been bedridden. Was operated upon at Woman's Hospital, New York, three years ago by Dr. Thomas for lacerated cervix. Condition improved. Menorrhagia and metrorrhagia again returned. Now flows severely at irregular intervals. At times, previous to an attack, a tumor may be felt just over Poupart's ligament. This disappears after hemorrhage.

When patient entered hospital a few days before operation the tumor could be felt. The next day patient began to flow severely, great pain resembling uterine colic. As flowing continued tumor disappeared. Per vaginam the dilated tubes could be felt.

Abdomen was opened, short incision, somewhat adherent, tubes and ovaries removed. Tubes dilated. Patient made an uninterrupted recovery. There was a slight show for a day during third week after operation.

CONCLUSIONS.—To one who has watched and studied carefully the different methods suggested for performing ovariectomy, there comes the thought of gratitude in knowing that so much progress has been made within a comparatively few years. Much that was rubbish was rejected, and we stand to-day as surgeons doing this operation on the best of all ground, surgical simplicity. If you ask me, to whom are we indebted the most for this, I say very earnestly Mr. Lawson Tait. First, in the proper preparation of sponges, and cleanliness in the care of instruments. Secondly, in the quiet of a well regulated private hospital, with intelligent and correctly trained nurses.

That abdominal section will at times, of necessity, have to be performed at the house of the patient, and without proper surroundings, can not be denied, but in such instances the spray of carbolic acid should not be entirely ignored, nor the free washing of the woodwork with the solution of bichloride of mercury, and the removal of all unnecessary furniture in the preparation of the room.

Beyond a doubt rooms can be provided in a general hospital, and, if kept only for such work, are a thoroughly safe place for performance of the operation, and yet, one can not help believing that a strictly private hospital for such work is, perhaps, the best. The doing of such an operation at the house of the patient increases the risk of non-recovery. In this respect, however attentive the surgeons may be, and however good the attendance of the trained nurses employed, still the friends of the patient will in some way bring about an interference that is disastrous too frequently.

In the treatment of fibroids one can not help indorsing all of Mr. Thomas Keith's writings, governed by his experience, which has been so extensive. Supra-vaginal hysterectomy is an operation that is likely to grow less frequent, but, in the use of electricity we have a curative agent that promises to be of great service.

My experience leads me to believe that aside from the soft myomas, the removal of the uterine appendages does have the desired effect in bringing about the menopause and saving the life of patient from the exhaustion of severe hæmorrhages.

Finally, I wish to record my regrets at the criticisms which surgeons in this country have made upon Mr. Tait's work. I am sure did they know the man better, and understand his methods more thoroughly, they would be more charitable in the future than they have been in the past.

AN EXPERIMENTAL CONTRIBUTION TO INTES-
TINAL SURGERY WITH SPECIAL REFER-
ENCE TO THE TREATMENT OF
INTESTINAL OBSTRUCTION.¹

(CONTINUED.)

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5. COLO-RECTOSTOMY.

AMONG the many possibilities in the operative treatment of intestinal obstruction a condition might be met with where the seat of obstruction is located low down in the colon, perhaps in the sigmoid flexure, and where it might be impossible or impracticable to remove the cause of obstruction, and where it becomes necessary to restore the continuity of the intestinal canal by establishing a communication between the permeable portion of the colon and the rectum. Such an anastomosis can be made as in ileo-colostomy by lateral implantation, lateral apposition by perforated approximation plates or by double suturing. For want of time only one experiment was made, and although the animal died of the immediate effects of the operation the local conditions at the site of operation found after death show that colo-rectostomy in selected cases is not only a justifiable and feasible operation, but whenever it can be done, it is always preferable to the formation of an artificial anus. As the operation by lateral apposition requires much less time than lateral implantation, it should be preferred to the latter procedure, and should be done by perforated approximation discs and a few superficial sutures.

¹Read in the Surgical Section of the Ninth International Medical Congress, Washington, September 5.

Experiment 90.—Medium-sized cat. Incision through the linea alba; colon cut transversely in the middle third and the distal portion, and the rectum cleared of its contents by injecting a stream of warm water from the cut end downward, a procedure which could only be well accomplished after forcible dilatation of the sphincter ani muscles. The distal end was closed in the usual manner. The rectum was drawn upward and an incision made into its anterior wall large enough to correspond with the lumen of the colon. Into this opening the proximal end of the colon was implanted by two rows of sutures. During the latter part of the operation, which lasted over an hour, the animal was seized by convulsions which continued for several hours, and finally subsided under the administration of whiskey given hypodermatically. The symptoms of shock, however, continued and death occurred 36 hours after operation. Numerous omental adhesions; closed end of bowel congested; peritoneal surfaces adherent; colon and rectum at point of implantation adherent.

REMARKS.—In cases where the obstruction is located some distance from the rectum where it would be impossible to approximate the permeable portion of the colon with the rectum, the entire colon must be excluded and the continuity of the intestinal canal restored by ileo-colostomy or ileo-rectostomy. In all cases of intestinal anastomosis where the communication is made in the lower portion of the colon or the rectum, the sphincters of the anus should be rendered temporarily incompetent by stretching for the purpose of guarding against overdistention of this part of the bowel during the time required for the healing process between the united intestines.

ADHESION EXPERIMENTS.

In works on abdominal surgery we invariably meet with the assertion that serous surfaces brought into apposition by suturing unite after a few hours. Isolated experiments and the results of post-mortem examinations have given rise to the general belief that serous surfaces so united will become firmly adherent in a very short time; but the question concerning the exact time for adhesion to take place, and for the definitive healing to be complete, can only be determined by experiments made for this special purpose. The following experi-

ments were made with a view of ascertaining the exact time which is requisite for adhesions and definitive healing between approximated serous surfaces to take place, and likewise to study the effects of local conditions which would hasten or retard these processes. It is quite important to make a distinction between the terms "adhesion" and "healing." Adhesion precedes the process of definitive healing, but implies simply the presence of an adhesive or cement substance between the serous surfaces, which mechanically agglutinates the parts, while definitive healing includes all the processes which take place during cicatrization. In intestinal surgery this distinction has an important practical bearing, as perforation may take place as long as the serous surfaces are simply held together by adhesions, while such an occurrence is beyond the reach of all possibilities after the approximated surfaces have become united by living organized tissue. Adhesions between serous surfaces take place by the exudation of plastic lymph, which acts the part of a cement material; while on the other hand the process of definitive healing is initiated by cell-proliferation from the preexisting endothelial and connective tissue cells, and the formation of a network of new blood vessels springing from each of the coaptated granulating surfaces. The processes are the same as we observe within blood vessels during cicatrization after ligature. In suturing an intestinal wound, or in making a circular enterorrhaphy, it has always heretofore been deemed necessary not to injure the peritoneum unnecessarily, for fear that such injuries would result deleteriously by interfering with the prompt union between the sutured surfaces. It is a well known fact in surgery that approximation of intact serous surfaces does not result in the formation of adhesions. When the surgeon desires to secure union between serous surfaces he resorts to mechanical or chemical irritation for the purpose of inducing a circumscribed plastic peritonitis, which invariably results in adhesions and the obliteration of the serous space. Reasoning from this analogy, I was induced to study the effects of traumatic and chemical irritation in hastening adhesions and cicatrization between apposed serous surfaces. In most of these experiments the se-

rous surfaces in the different operations were held in contact by perforated approximation plates, and in case artificial means were resorted to, to expedite the healing process, the fact is mentioned, and the result of such modification noted. The animals operated on were all dogs.

TIME SIX HOURS.

Experiment 91.—The ileum was divided near its middle, and both ends closed by invagination and the continued suture. Ileo-ileostomy was made at two points making two openings of communication. No suturing. Parts kept in apposition by perforated decalcified bone plates. To compare the effect of traumatic irritation of the peritoneum in the reparative process with the intact serous surface, the peritoneal surfaces at one point of operation designated as the upper were scarified with the point of a needle over an area corresponding to the size of the bone discs, the scratches being made sufficiently deep to penetrate the entire thickness of the peritoneum. The scarifications were made in a longitudinal and transverse direction mapping out the serous surfaces into small squares. Only slight oozing followed this procedure. The serous surfaces between the plates, (No 1.) where no scarification was made were found slightly adherent by a scanty deposit of plastic lymph. At No. 2, where scarification had been done, the amount of plastic lymph was greater and stained by blood and the adhesions much firmer.

TIME TWELVE HOURS.

Experiment 92.—In this experiment the bowel was not interrupted by division, but two adjacent coils of the ileum were united by making an ileo-ileostomy by perforated decalcified bone plates, plates holding the parts perfectly in apposition: a slight tumefaction of the intestinal walls has made the coaptation more secure. Coaptated serous surfaces very vascular, covered with a thin layer of plastic lymph which has agglutinated the folds of the intestine brought in contact.

Experiment 93.—Bowel not divided, but two adjoining loops of the ileum united by making a double ileo-ileostomy by perforated approximation discs, the two communicating openings about six inches apart. At one point of operation designated as No. 2, serous surfaces freely scarified. At both points the adhesions were perfect throughout, but where scarification was made they were notably firmer.

Experiment 94.—In this experiment a gastro-enterostomy and an

ileo-ileostomy were made at the same time and on the same animal. In both operations the parts were coaptated by perforated decalcified bone plates. Scarification of peritoneal surfaces at both places. The adhesions between the anterior surface of the stomach and upper portion of jejunum were uniform throughout, over the whole surface, kept in contact by the plates. There was no leakage on distending the stomach and intestine forcibly by water. The adhesions between the folds of the ileum at point of approximation were, if anything, firmer than between stomach and jejunum. The decalcified bone plate in the interior of the stomach was softened more than those in the intestine.

TIME EIGHTEEN HOURS.

Experiment 95.—Gastro-enterostomy by perforated decalcified bone plates: communication made between stomach and upper portion of jejunum: no scarification. Agglutination quite firm, so that forcible distention of stomach and bowel causes no leakage. New opening sufficiently large to admit middle finger and apparently lined throughout by mucous membrane. Plate in stomach very much softened and on the verge of becoming detached. On forcibly separating the adhesions the serous surfaces are found to be cemented together by a thin layer of plastic lymph, and after scraping this away they appear vascular, rough, as though completely deprived of the endothelial covering.

TIME TWENTY-FOUR HOURS.

Experiment 96.—Triple ileo-ileostomy without division of the bowel; the operations were numbered 1, 2, 3, respectively. Coaptation by approximation discs of decalcified bone. Communicating openings about six inches apart. In No. 1 no scarification. No. 2 scarification of one loop only. No. 3, scarification of both serous surfaces. After 24 hours the result was as follows:

1. Lymph scanty; adhesions not very firm.
2. Lymph more plentiful; adhesions firmer.
3. Lymph more abundant than in No. 2, and mixed with a fine stratum of coagulated blood; adhesions also firmer. The adhesions increase in firmness in the order 1, 2, 3.

Experiment 97.—Double gastro-enterostomy by perforated decalcified bone plates. The communicating openings, one near the pyloric, and the other near cardiac extremity of the stomach, were made be-

tween the anterior surface of the stomach, and the upper portion of the jejunum. In operation No. 1, near the pylorus the intact serous surfaces were brought in contact, while in the second operation both the stomach and bowel were scarified. At the post-mortem, it was found that the adhesions at both places were of sufficient firmness to prevent leakage under pressure. In No. 2 adhesions firmer and the inflammatory infiltration more marked than in No. 1. Plates in stomach much softened, but remain in situ. Openings lined throughout by mucous membrane and sufficiently large to admit the index finger.

Experiment 98.—Ileo-colostomy by lateral apposition and fixation by perforated approximation discs. Lower portion of ileum united with the ascending colon. No scarification; bowels lightly agglutinated throughout, by a very thin layer of plastic lymph; adhesions, however, can be easily separated, and where this is done the peritoneal surface appears denuded of endothelial cells, and very vascular with new vessels along the outer margin of the surface of approximation.

TIME FORTY-EIGHT HOURS.

Experiment 99.—Double gastro-enterostomy. The communicating openings were between the anterior surface of the stomach and the duodenum, and the posterior surface of the stomach and the upper portion of the jejunum. In the posterior operation the intact serous surfaces were brought in contact, while in the anterior the peritoneal surfaces of the stomach and duodenum were scarified. In both operations perforated decalcified bone plates were used. Adhesions between posterior surface of stomach and bowel uniform throughout, but easily broken down; the peritoneal surfaces injected and apparently deprived of their endothelial covering. The anterior operation has resulted in the formation of firm adhesions, the products of exudation and tissue proliferation being supplied with new vessels, the circumscribed plastic peritonitis being much more advanced than at the site of the posterior operation.

Experiment 100.—Double ileo-colostomy by perforated approximation plates. The anastomosis between the lower portion of the ileum and the colon just above the cæcum was made without scarification, while in the second operation about six inches higher up in the colon and ileum both serous surfaces were freely scarified. Omentum adherent at point of operation. Plates swollen, softened and pliable, but still efficient in maintaining coaptation and fixation. Adhesions at both places quite firm, but more so in the upper portion where scarification had been done.

Experiment 101.—Ileo-colostomy by approximation discs. The ileum was divided a few inches above the ileo-cæcal region and both ends closed by invagination, and three stitches of the continued suture. An anastomosis was made between the proximal end and the ascending colon by lateral apposition. No scarification. Intestines agglutinated at point of operation, but the adhesions gave away when the bowel was forcibly distended under hydrant pressure.

7. CHEMICAL IRRITATION OF SEROUS SURFACES.

In these experiments it was aimed to study the effect of chemical irritation of the peritoneum in the reparative process after intestinal operations. Iodine has been used for a long time in producing plastic inflammation of serous surfaces for the purpose of obliterating serous cavities, consequently this substance was used in the first experiments. To study the effects of the diffuse application of tincture of iron to the intact peritoneal cavity the following experiments were made.

8. INJECTION OF CHEMICAL IRRITANTS INTO THE PERITONEAL CAVITY.

Experiment 102.—Medium-sized dog. The needle of a hypodermic syringe was thoroughly disinfected, and a drachm of the tincture of iodine injected into the peritoneal cavity. Immediately after the injection the animal evinced great pain, which, however, appeared to subside after a short time, and subsequently no unfavorable symptoms were observed. Three days after the injection the urine was examined and showed the presence of iodine. Dog killed nine days after the injection. Circumscribed plastic peritonitis over a space four inches square, corresponding to the point where the puncture was made. At this place the omentum was much thickened, very vascular and adherent to the parietal peritoneum and the adjoining folds of the intestines.

Experiment 103.—Medium-sized dog. A fluid drachm of the tincture of muriate of iron was thrown into the peritoneal cavity by means of a well-disinfected hypodermic syringe. The pain immediately after the injection was intense, and the animal appeared to be very ill two days after the injection, and died with well marked symptoms of peritonitis on the sixth day. Diffuse plastic peritonitis was found to be the cause of death. The omentum was adherent everywhere, and the intestines were matted together by numerous adhesions. The abdominal cavity contained a considerable quantity of serous fluid.

REMARKS.—Both experiments prove that when tincture of iodine and tincture of iron are brought in contact with the peritoneum a plastic inflammation ensues, and it was reasonable to expect that if either of these substances could be applied to the serous surfaces which it was intended to unite, the reparative process would be hastened.

Experiment 104.—Triple ileo-ileostomy by perforated decalcified bone plates. Three internal fistulæ were made between the adjacent loops of the ileum about six inches apart. In operation No. 1 approximation of intact serous surfaces: in operation No. 2 the serous surfaces were painted with tincture of iron over an area corresponding to the size of the plates. In operation No. 3, the serous surfaces over the same extent were brushed with pure tincture of iodine. The animal was killed 48 hours after operation, and the following conditions were noted: No general peritonitis. All the plates firmly in place coaptating the serous surfaces accurately, the swelling of the tunics of the bowel only serving to enhance their efficiency. At No. 1 adhesions quite firm, flexion of bowel and marked injection of serous surfaces. At No. 2 no adhesions between serous surfaces. The peritoneal surfaces to which the tincture of iron had been applied appeared stained, almost black, and at some points the serous coat was destroyed. At No. 3 peritoneal surfaces stained dark brown; adhesions firm, and an abundance of plastic lymph even beyond the margin of the plates.

Experiment 105.—Double ileo-ileostomy by approximation plates and omental grafting. Operation No. 1, approximation of ileum to ileum by perforated decalcified bone plates, serous surfaces intact. Operation No. 2, similar operation six inches higher up uniting the same loops, but painting the serous surfaces with pure tincture of iodine. Operation 3. Cut off a piece of omentum 2 inches wide and sufficiently long to encircle the entire bowel. After scarifying the bowel, and the omental graft on one side, the scarified surfaces were brought in contact, and the graft fixed in its place by two fine catgut sutures passed through the mesentery and both ends of the graft. Animal killed 48 hours after operation. All plates firmly in place. At No. 1, adhesions firm. At No. 2, dark-brown discoloration of surface to which the iodine had been applied, agglutination over the whole surface. Under hydrostatic pressure the adhesions first gave way between the two plates where the iodine had been applied, showing conclusively that chemical irritation of serous surfaces does not hasten the adhesive process, while it may, and probably does, expedite the

definitive healing. At No. 3, omental graft firmly adherent to the entire circumference of the bowel and beginning vascularization of the graft around its margins.

REMARKS.—In all of these experiments the post mortem examinations showed no evidences of diffuse peritonitis. In most of the cases the inflammatory process was limited to the portion of the bowel interposed between the plates. Without exception the adhesions formed were firmest and the definitive healing was initiated first where scarification was performed, results which clearly demonstrate the fact that the reparative process between serous surfaces which it is intended to unite is hastened by traumatic irritation. Traumatic irritation by scarification of the peritoneal surface with the point of an aseptic needle, is the most potent means to provoke a circumscribed plastic peritonitis, and is followed within a few hours by a copious exudation of plastic lymph, which like a cement substance, mechanically agglutinates the coaptated serous surfaces. The same measure by destroying the continuity of the non-vascular layer of the peritoneum brings at once in contact the vascular network of both sides of the bowel, and opens up a direct route for the new vessels, an important element in the rapid healing of the visceral wounds. Chemical irritants by destroying the endothelial layer of the peritoneum rather retard, than favor, early adhesion and union between the coaptated bowels, and should therefore not be resorted to in intestinal surgery with a view to hasten the reparative process.

[TO BE CONCLUDED.]

EDITORIAL ARTICLES.

THE SURGICAL TREATMENT OF ACUTE INTESTINAL OBSTRUCTION.

An interesting discussion upon acute intestinal obstruction, with especial reference to its surgical treatment, took place at the annual meeting of the New York State Medical Society, held at Albany, on February 8, and it will not be unprofitable to review some of the opinions expressed.

The causes and symptoms of all the various forms were very carefully enumerated by Dr. Lewis A. Stimson, but the only diagnostic signs which could be pointed out were the history of previous peritonitis in obstruction by bands and adhesions; the history of previous attacks of biliary colic in obstruction by gall-stones; the slow development of stricture and neoplasms of the bowel and the occasional presence of a tumor in the abdomen in the latter cases; and the subacute course, the passage of blood and mucus from the anus, with tenesmus, and the tumor to be felt in the abdomen and rectum in cases of intussusception. To these diagnostic signs must be added the observation of Dr. A. Jacobi, that in fecal impaction the thermometer, placed in the rectum, would indicate a slight elevation of temperature, due to colitis, local peritonitis, and septic absorption—an elevation which was absent during the first two or three days of obstruction from other causes.

Dr. Stimson emphasized the fact that these distinctive symptoms were frequently absent, and that even when present they were not altogether reliable. For instance, acute obstruction is quite often the first marked sign of cancer or stricture, as was shown in one of his cases, in which there had been no symptoms from a very tight stricture of the transverse colon, until it was blocked by an apple-seed.

Spontaneous recovery was possible only in intussusception, a stric-

ture blocked by some foreign body, and perhaps in cases of impacted gall stone. Even in these cases spontaneous recovery was so rare that if the surgeon could exclude paralysis of the intestine and impacted feces as the cause of the obstruction in any case, it was clearly his duty to attempt to relieve the patient by operative measures. But the difficulty lay precisely at this point, to exclude paralysis and impacted feces at a sufficiently early period in the case. This sentiment was echoed by all the speakers. And a very practical statement of the dilemma was made by a gentleman who styled himself a country doctor, who was anxious to learn how to *know* when the cause of obstruction was such as to require operation, for the doctor in the country might have to call a surgeon twenty or even one hundred miles to see the patient, and could not rest satisfied with mere guessing.

Dr. Arpad G. Gerster thought that the failure to make an early diagnosis was often due to the fact that it was too much the habit of the physician to consider these cases when first seen as examples of ordinary colic, and to omit a thorough physical examination of the abdomen at that time, thus losing the favorable moment before tympanites rendered such an examination impossible.

It must be confessed, however, that none of those who took part in the discussion added anything to our powers of diagnosis. In fact, if anything marked the numerous cases related by Dr. William C. Wey, Dr. Simmons, and others, to prove that apparently desperate cases, suffering from symptoms of collapse and fecal vomiting, may recover, it was the close resemblance between them and the fatal cases of intestinal obstruction. But the statement of Dr. Robert F. Weir is worthy of note. That valuable time was often lost in attempting to determine the exact cause and site of the obstruction, and that the point to be decided in these cases was not where and what the obstruction was, but whether there really was an acute obstruction of such a nature as to require relief by operation.

In regard to the recovery of desperate cases without operation, the same speaker made the pertinent remark that while such cases were known to all, what he desired to learn was the relative proportion

which they bore to the desperate cases which terminated fatally, for in these same desperate cases the surgeon could probably save nearly thirty per cent., and it was important to discover what proportion could recover without his assistance, in order to decide upon the relative worth of medical and surgical treatment. If the number of cases treated by early operation were increased, the percentage of mortality would be very much reduced. Therefore, even if some cases which might have recovered spontaneously were submitted to operation, probably a larger proportion of all the cases of intestinal obstruction would be saved than with the present custom of delaying operation until there is no hope of spontaneous recovery.

Dr. Weir also remarked that with every case in which the surgeon performed laparotomy, and found a volvulus, a band, or some other cause of obstruction which could not be relieved in any other way, he felt encouraged to operate upon his next case without waiting until the symptoms were so marked and the patient in such a miserable condition as to place the diagnosis beyond all shadow of doubt. He knew of no case in which laparotomy had been performed, and fecal impaction found as the sole cause of obstruction, and thought such an error unlikely to occur, in spite of the occasional cases in which laparotomy has been performed and no obstruction found. These two facts certainly warrant Dr. Weir's feeling that it was time for the physician to know of the growing confidence of the surgeon in the necessity for operative treatment in these cases, and to be led by the influence of that faith to bring the cases to the surgeon before every chance of success had been squandered by delay.

As Dr. A. Vander Veer remarked, the need of the hour is a series of cases of successful, early operations, in order that the physicians may be encouraged to refer their cases of acute intestinal obstruction to the surgeon before it is too late.

The statement made by Dr. Weir, that if severe pain, vomiting, and constipation had lasted for forty-eight hours, it is necessary to operate at once, was so qualified that it could not be taken literally, but was evidently intended to stimulate the discussion, and to urge the necessity for a very early operation. A similar statement was made with a like pur-

pose in view by Dr. William T. Bull, in reporting some cases of laparotomy at the February meeting of the Practitioners' Society of New York. It must also be remembered that Treves has already advised operation, in cases of intussusception, in the first forty eight, or if possible in the first twenty-four hours after the development of marked symptoms. The statistics presented in this discussion by the writers show the necessity for an early operation, but after the first three days, for which the mortality was respectively 62%, 70%, and 73%, there is no regular variation exhibited by the death-rate, probably because the symptoms in the cases which were postponed for a long time were not so severe as in the cases which were operated upon during the first two or three days. It is evidently impossible to place any exact time limit before which the operation must be performed in order to secure success, for the severity of the symptoms and the necessity for haste vary so much in different cases.

The indications laid down by Dr. Roswell Park as guides in the choice between laparotomy and enterostomy are not entirely free from objections, as was probably felt by Dr. Park himself, for he expressly stated that he thought the question was not yet ripe for decision. He favored laparotomy when the diagnosis of a cause which could be removed was certain, and when suppurative peritonitis was present, for the peritonitis could best be treated by laparotomy. But if the cause of obstruction was a malignant tumor of the intestine, if the tympanites was extreme, and if the cause of obstruction could not be determined, enterostomy was to be preferred. These are very nearly the rules propounded by Verneuil in the discussion upon intestinal obstruction in the Société de Chirurgie of Paris last Spring. Now, it is unanimously agreed that, with the exception of intussusception, stricture, and neoplasm of the intestine, the diagnosis of the cause of obstruction is impossible, consequently the adoption of such rules as those just quoted means a restriction of laparotomy to the exceptional cases.

These rules also leave out of consideration the chief factor to be regarded in making our decision—the condition of the patient at the time. In the introduction to his paper upon the technique of laparotomy for intestinal obstruction, Dr. Weir appears to me to have

indicated the correct answer to this question. He says that, although laparotomy be scientifically the only proper method of treatment for acute intestinal obstruction, it often promptly terminates the life of the patient, because of the profound shock which accompanies this condition; but that enterostomy, although in itself only palliative, sometimes yields brilliant results, and at least does not add to the shock which is already present.

It is the belief of the writer that when the patients are in the state of exhaustion in which most of them now are when placed in the hands of the surgeon, enterostomy, which may even be performed without a general anæsthetic, is the only justifiable operation. I am confident, also, that we have no idea at present as to what the recent results of enterostomy for acute intestinal obstruction really are, for the statistics of Treves probably do not fairly present them. In the future these cases will be brought to the surgeon at an earlier period, and the better condition of the patient will justify the performance of laparotomy as frequently then as now, while the results obtained will be far better than at present, although it is not probable that the sanguine views of Greig Smith will be realized with a reduction of the mortality to "about fifteen per cent."

In the opinion of Dr. Weir, a very long incision should be made in performing laparotomy for intestinal obstruction. Although he would not consider it wise to blindly follow in every case the proposal of Kümmel, to make an incision from the ensiform cartilage to the pubes, he looked upon it as a distinct advance, because it recognized the necessity for making the operation as brief as possible, while the large incision did not materially increase the dangers of the operation, and even facilitated the reduction of the distended intestine after the obstruction had been found and relieved. The reality of this gain of time is shown by Kümmel's statement that he had performed the operation in twenty minutes, whereas everyone knows that these operations generally require an hour, and not infrequently twice that time. The necessity for a short operation is well shown by the cases collected by the writer, which give a mortality of 55.7% in 190 cases in which the operative interference was limited to relieving the obstruction,

without wounding the bowel; while it rose to 73.3%, in 15 cases in which it was necessary to establish an artificial anus after the obstruction had been removed; and to 83.3%, in 48 cases in which the gut had to be sutured. In all these cases the true danger lay in the length of the operation, not in the yielding of the sutures, for death was caused by sepsis in only 10% of the fatal cases.

Chloroform was strongly recommended by Dr. Weir as the anæsthetic most suitable for these cases—a recommendation all the more valuable, as it came from one who employs ether for all his general surgical work. Ether seemed to him to cause more shock than chloroform, and the subsequent bronchial irritation was very injurious. Dr. Gerster and others agreed in this opinion.

As to other methods of treatment, all united in condemning puncture of the gut, because there was great danger that the openings would fail to close, owing to the paralyzed state of the wall of the bowel. Dr. Francis Bacon, of New Haven, related two cases of intussusception treated lately by him with success by inflation; but here again Dr. Park stated that in one case in which he had performed laparotomy he had found that previous attempts at reduction by inflation had caused a perforation of the gut, and this complication had resulted in the death of the patient.

Finally, the results of operative treatment were considered by the writer, who found a mortality of 68.4%, in a collection of 339 cases. In the 232 fatal cases, the cause of death was the poor condition of the patient in 103 cases, complications in 41, and failure to find or to relieve the obstruction in 30. The reports were incomplete in 13 cases. Of the remaining 45 cases, 13 died of shock, 3 from an unusually prolonged operation, 17 of sepsis which was probably due to the operation, and in 12 cases the cause of death could not be definitely ascertained. For further details the reader is referred to the paper itself, published in this number of the *ANNALS OF SURGERY*.

The opinion of Dr. Jacobi, that laparotomy for intestinal obstruction should be classified with tracheotomy and herniotomy, and looked upon as one of the operations which every practitioner should be prepared to perform upon an emergency, when the assistance of an ex-

pert could not be procured, is certainly not to be accepted without important reservations. As Dr. Bacon remarked, the elaborate technique described by Dr. Weir gave the uninitiated some idea of the great difficulties to be overcome in these operations, and the complicated manœuvres which must frequently be resorted to. This alone should serve as a warning to those without experience in abdominal surgery, and certainly to those without any surgical training, not to undertake these very difficult operations rashly. While it is true that not a few of the successful operations have been performed by country physicians, with insufficient help, scanty towels, doubtful water, and the most unpromising surroundings, no physician should neglect any precaution which tended to improve the chances of the patient, and he should at least allow him the advantage of the most skilful surgeon available. At the same time we may agree with Dr. Jacobi in so far that no physician should allow a patient to die, merely because he is lacking in courage to undertake an operation which he is really competent to perform.

As a substitute for the proposal so often made, that all cases threatened with acute intestinal obstruction should be handed over to the surgeon forthwith, a proposal which is probably too chimerical ever to be adopted, Dr. Weir made the very practical suggestion that in such cases a surgeon should be associated with the physician, a suggestion which deserves very serious consideration, for there is no malady where the double counsel is so necessary as in this perplexing and desperate condition.

On the whole, the discussion was very encouraging—not that it added much that was new to our store of facts, but because it showed the great interest felt in the subject, and with such eager observers some increase of knowledge may surely be expected before long. Certainly, the errors due to negligence and hesitation, altogether too frequent hitherto, even in cases in which there was no excuse for hesitation, will not occur in the future—at least in the state of New York.

B. FARQUHAR CURTIS.

INDEX OF SURGICAL PROGRESS.

ABDOMEN.

I. On the Exclusion of Dead Spaces from the Peritoneal Cavity, with Special Regard to the Extirpation of Tumors Starting from the Pelvic Cavity. By J. MIKULICZ (Koenigsberg). Abdominal operations are subject to septic complications from other sources than faulty antisepsis, injury of the gut, or rupture of a cyst. Laparotomies for removal of large tumors firmly attached to the lower pelvis or developing subserous in the pelvis (especially uterine myoma) favor this indirect infection. The trouble arises from the difficulty in keeping aseptic a large traumatic cavity low in the pelvis. As has been repeatedly shown we are not able to keep bacteria germs from a wound completely. But the tissues so long as living come to our aid; if from any cause they cease to do this, then infection often occurs.

The normal peritoneum has two characteristics that oppose septic processes; it absorbs decomposable secretions quickly; and inflammatory products are encapsulated by adhesions. Now these two helps are lost if the peritoneum has been extensively injured or removed, in its lower part. Here secretions collect, and the germs are only impeded at the walls. This he terms a dead space. Compression, drainage or irrigation are unsatisfactory, and the moist blood clot (Schede) here unsafe. The severity of laparotomy for removal of myomata with a large base—leaving a vascular and abundantly secreting wound—is well known. The mortality is 5 to 10 times as great as from laparotomy, due in large part to sepsis.

Küster and also Terillon have stitched up the peritoneum and plugged the wound-space with iodoform-gauze. Independently of these M. hit on a like plan with the further endeavor to make it applicable to cases where the peritoneal cavity cannot be occluded. He

takes a piece of 20% iodoform gauze, the size of a large handkerchief and fastens a long, stout silk thread to the center. This is provisionally laid in 5% carbolic. After completing the intra-abdominal part of the operation, the gauze is folded into a pouch with the thread coming out at the neck. He pushes the middle of the pouch by forceps into the lowest part of the pelvis and then fills it loosely with other iodoform gauze. The string serves later in removing the deepest gauze. Where sufficient peritoneum remains it is stitched to the lower angle of the wound, otherwise the gauze comes in direct contact with the intestines. The neck of the gauze-pouch and an end of each contained strip are spread out on the outside of the wound and covered with an abundant dressing. The remaining wound opening must not be so small as to compress the traversing gauze. This pouch serves a four-fold purpose.

1. As a tampon to stop hemorrhage.

2. For drainage simple and complete by capillary action. In all of his cases a large amount of sanguineous serum poured into the external dressing the first 24 to 48 hours. This greatly simplifies the remaining treatment. The first dressing remains 48 hours. If it soaks through, cover with simple removable material. At the end of this time he usually removes everything but the pouch. A 6 to 10 cm. long drain is introduced into its neck, chiefly to preserve the opening. In 5 to 6 days p. o. the secretion has usually become minimal, when even the pouch is removed. An 8 to 12 cm. long large drain is now used, and later rapidly shortened as the secretion diminishes. In but one case did a fistula persist, requiring an operation for its closure some months later.

3. The tampon guards wound and peritoneum from sepsis, even, as one of his cases shows, when gut or bladder has been injured. In only one case did fatal peritonitis follow, and here there were complications to explain it.

4. The method is applicable to all classes. The danger of iodoform intoxication is lessened by the outward flow of the secretions; possibly other antiseptic material might be satisfactorily substituted, though he saw no signs of this danger in his cases. He suggests the proba-

ble value of this method in laparotomy for extrauterine pregnancy and for tumors of the pancreas.—*Arch. f. kl. Chir.*, 1886, bd. 34, hft. iii.

WM. BROWNING (Brooklyn).

II. Contusion of the Abdomen with Rupture of the Intestine. By B. FARQUHAR CURTIS, M.D. (New York). This elaborate paper defines the following conclusions: (1). The treatment of contusion of the abdomen should be purely expectant in the early stage, until symptoms of internal injury have appeared, or until the full extent of time in which they may be expected has passed. Explorative laparotomy at this time is inadmissible. (2). When symptoms of uncontrollable internal hemorrhage or serious visceral injury appear, laparotomy is indicated: but when the diagnosis is uncertain, the operation should always be begun as an exploration. (3). Great collapse is an absolute contraindication to all operative interference. (4). When rupture of the intestine is found, the best method of treatment is to secure the injured gut in the abdominal wound, and form an artificial anus. This can be easily relieved by a later operation, when the patient has recovered his strength.—*Am. Jour. Med. Sci.*, Oct., 1887.

III. Circular Suture of the Intestine. By WILLIAM S. HALSTED, M.D. (New York). This paper is an elaborate experimental study of this subject, which may be summarized as follows:

It is impossible to suture the serosa alone, as advised by authors.

It is impossible to suture unfailingly the serosa and muscularis alone, unless one is familiar with the resistance offered to the point of the needle by the coats of the intestine. Furthermore, stitches which include nothing but these two coats tear out easily, and are, therefore, not to be trusted.

Each stitch should include a bit of the submucosa. A thread of this coat is much stronger than a shred of the entire thickness of the serosa and muscularis. It is not difficult to familiarize one's self with the resistance furnished by the submucosa, and it is quite as easy to include a bit of this coat in each stitch as to suture the serosa and muscularis alone.

It is unnecessary in performing circular suture of the intestine to

make more than one complete row of stitches, if they be of the plain-quilt variety. Unless all of the stitches of the row are applied before a single one is tied, it is impossible to preserve a straight line in the application of them.

It facilitates the operation very much to make five or six presection sutures; the eversion of the mucous membrane, which otherwise takes place and makes the application of first-row, postsection stitches troublesome, is thus prevented. The first presection stitches should be introduced at the mesenteric border of the intestine, and at a place as free from fat as possible.

The plain-quilt stitches are to be preferred to the ordinary Lembert's stitches, because: (1), one row of them (the former) is sufficient for the circular suture; (2), the knots of the first row of Lembert's stitches prevent the most accurate apposition of the opposed peritoneal surfaces; (3), the plain-quilt stitches constrict the tissues less than the Lembert's stitches; and (4), the former tear out less easily than the latter. Madelung's cartilage-plates, which he employs partly to prevent the tearing out of the stitches, are unnecessary when a bit of the submucosa is taken up with each stitch.

The vessels of the excised intestine should be ligated by circumvection. It is not necessary to exsect a triangular piece of mesentery, and it is unadvisable to sew together the edges of the rent in the mesentery, for, in so doing, one might include small vessels which contribute to the blood supply of the sutured parts.

Solutions of corrosive sublimate stronger than 1:20,000 should not be used for irrigation. It would be better, perhaps, to employ weaker solutions (1:30,000 or 1:40,000). The irrigation should be attended to most diligently when the stitches are being tied.—*Am. Jour. Med. Sci.*, October, 1887.

JAMES E. PILCHER (U. S. Army).

IV. Intestinal Obstruction. This subject after being introduced by a paper by M. VERNEUIL was discussed at the Société de Chirurgie of Paris. Although M. DESPRÈS thought that the diagnosis was easy in 90 cases out of 100 (his diagnosis had been correct in 10

out of 11 cases) the other speakers considered it very often difficult. When symptoms like those of a strangulated hernia appear suddenly M. Desprès would expect strangulation from a band. When obstruction comes on slowly without intense vomiting, and with some passage of wind, the cause may be cancer, paralysis or invagination. M. MARC SÉE was in favor of waiting where neither fever nor vomiting are present, and where distention and colicky pains are the chief complaint. A case with such symptoms under his care came right in the end after 42 days of obstruction. The treatment adopted had been enemata of fluid and of air, and electricity. Some capillary punctures to relieve the gaseous distention had been also tried. M. VERNEUIL objected to these punctures as dangerous and as of little use.

As to cancerous obstructions where the exact seat is uncertain M. Le DENTU prefers to make for the cæcum as on the whole most likely to give relief.

In acute and doubtful cases M. RICHELOT advises an exploratory laparotomy with the object of finding and relieving the cause of the mischief. He considers the formation of artificial anus in the small intestine in such cases as a confession of failure, of doubtful value at the best and useless in mechanical obstruction.—*Le Bulletin Médical*, May 29, 1887.

CHAS. W. CATHCART (Edinburgh).

V. Intestinal Obstruction from Volvulus ; Laparotomy.

By D. W. CHEEVER, M.D. (Boston). A man, æt 23, hitherto in good health, was seized with abdominal pain and tenderness, particularly in the region of the umbilicus, with persistent constipation and vomiting, at first thin and colorless and later stercoraceous. Collapse threatening, an incision 5 inches long was made in the right linea semilunaris downward from the level of the umbilicus ; no cause for the obstruction could be found, and an artificial anus was formed and the wound closed. This patient did not rally and *death* ensued three hours later. The autopsy revealed that the cæcum had no attachments and that the ascending colon had a long meso-colon, and that this portion of the colon had been twisted upon itself once and a half at a point 30

cm. above the ileo-cæcal valve.—*Boston Med. and Surg. Jour.*, July 7, 1887.

JAMES E. PILCHER (U.S.Army).

VI. Intestinal Obstruction; Volvulus or Twist (?) ; Laparotomy. By CHARLES STONHAM, F.R.C.S. (London). A laundress, æt. 18, previously in good health, was troubled with slight abdominal pains about 12 o'clock on March 14, 1884. In the afternoon they became suddenly worse, and she had to leave her work. After this symptoms indicating intestinal obstruction appeared, but without any external manifestation either of a hernia or of any other cause. She was treated by hot fomentations, and a grain of opium every four hours, and an enema of a pint of warm oil. As no real relief was obtained and sickness continued, on March 18 abdominal section was performed. Her condition was then as follows. Vomited matter not stercoraceous—constant nausea, abdomen a good deal distended, especially above and to the left of umbilicus, pain diminished by opium, tongue dry, brown and cracked. Patient nervous and anxious. Pulse 120; temperature 100°. Under chloroform Mr. Stonham opened the abdomen "in the usual way," and the greatly distended transverse colon immediately protruded. The peritoneum was acutely inflamed and coated with recent lymph. The sigmoid flexure and descending colon were found empty when traced from below, "but on arriving at the splenic flexure there was suddenly a large escape of flatus by the anus, and the distended transverse colon collapsed at once." The operator could only account for the relief by supposing that he had without knowing it undone a twist. Except a few recent adhesions nothing further abnormal could be seen. The spray was used. The abdomen was much smaller at the end of the operation. A grain of opium every hour was ordered. Next day bowels moved twice, and, though some sickness followed food, she was much improved. Her *recovery* was rapid and she left hospital in April for the country. She was heard of in good health in 1885. In his concluding remarks the author speaks alternately of volvulus and of twist as being the condition which caused the symptoms. It is difficult to understand which of the two he leans to or whether he considers them not two separate

conditions but one and the same.—*Brit. Med. Jour.*, May 21, 1887.

VII. Intestinal Obstruction Relieved by Laparotomy.
By G. E. WILLIAMSON (Newcastle on Tyne). The patient, a groom æt. 22, was first seen in consultation by the operator August 27, 1886. History no present nor previous hernia, but two attacks of severe abdominal pain two or three years before. August 13, after a large dinner of pork, hastily consumed, he was suddenly seized with severe pain in belly and with vomiting. Next day, after a dose of castor oil, vomiting ceased, but returned in two days, and was fæcal on August 19. On the 21st patient was almost in a state of collapse; pulse small and quick, tongue dry, temperature not raised, fæcal vomiting, abdomen distended and tender about umbilicus and cæcum; no tumor perceptible; no information by rectal examination. August 22 a large enema of fat mutton broth was traced to pass into the cæcum. In 2 or 3 hours it was returned without fæcal matter. Temporary cessation of vomiting with improved pulse followed this. It returned, however, and on the 25th an examination of the abdomen was made under chloroform without result. On the 27th, in a fortnight after onset, at the consultation, there was less prostration than was expected—perhaps owing to belladonna and morphine taken—tongue very foul, fæcal odor of breath. Abdomen tense, somewhat tender, and with coils of intestine apparent through wall, resonant throughout except over a small area in right iliac fossa. Abdominal section was decided upon. Only a small quantity of urine was withdrawn by the catheter, although for some days difficulty in passing water had been complained of. As obstruction was thought to be near cæcum, an incision was made in right linea semilunaris, and the peritoneum opened. Hæmorrhage extremely slight. Fingers, then whole hand introduced. Nothing found near cæcum. In umbilical region a cord of thickness of a lead pencil passed from behind umbilicus towards pelvis. This when brought to the surface was found to be collapsed intestine. When traced it passed down towards into ordinary gut and upwards into a region of localized peritonitis with adhesions. Two firm bands were brought into view and divided be-

tween ligatures, and then adhesions were freed. The wound was sewn up with silk worm gut stitches passed through the whole thickness of the abdominal wall. No spray was used. The surrounding skin was washed with weak corrosive lotion and the sponges wrung out of the same. The bowels acted well a few hours after the operation. In 24 hours temperature was 99° ; pulse 100. And in every way the *recovery* was rapid and complete, the wound healing in a fortnight under a dressing of Gamgee tissue. Eight months after the operation the patient was well, no bulging of scar and no intestinal disturbance. He was doing light work, wearing a belt and broad pad. The strangulation was believed to have been caused either by a twist or by bands secondary to adhesion of the small intestine to the anterior abdominal wall.—*Brit. Med. Jour.*, May 21, 1887.

VIII. Intestinal Obstruction Relieved by Laparotomy; Rupture of Strangulated Gut; Artificial Anus; Enterectomy. By C. J. BOND F.R.C.S. (Leicester). A man *æt.* 22 was admitted into Leicester Infirmary with marked symptoms of intestinal obstruction which had begun five days before. Pain greatest at epigastrium. Abdominal section in the linea alba was performed on the same day. The incision was large enough to admit the hand. After some searching and drawing out of collapsed bowel, a band was found uniting two adjacent portions of mesentery and within which a knuckle of bowel was constricted. After the band had been severed the bowel was gently raised from its bed, but as the adhesions were being separated, a rupture took place and some *fæces* escaped. The peritoneal cavity was well sponged and washed out with warm boracic lotion, after which the wound was partly stitched up and the injured intestine brought to the surface. The small opening was enlarged transversely, and a free escape of gas and *fæces* took place internally. The patient rallied from the operation, but wasted rapidly as the fistulous opening was high in the jejunum. On the 8th day a slight improvement was effected by passing into each end of the gut an India rubber tube four inches in length and 1 inch in diameter. This crossed the fistulous opening, where it was held in position by a string, and besides helping to transmit the intestinal contents onward prevented excessive doubt

ling of the intestine on itself and repressed the spur below. Mr. Bond attributes the suggestion of this device to Mr. Banks, and believes that it is a useful preliminary for a plastic operation, if not in itself sufficient to bring about a cure. After 20 days of this treatment a plastic operation, like that suggested by Duncan (*Lancet*, 1873) was attempted, *i. e.*, without disturbing the peritoneal adhesions, the edges of the mucous membrane were freed all round, inverted and stitched together while the skin was dissected up and its divided edges drawn together over the opening. On the 2d day bile oozed through, and the wound soon opened up again. After 14 days more treatment with India rubber tubes, which reduced the spur, the abdomen was opened above the artificial anus, the adhesions were felt and carefully divided, and the affected bowel drawn out at the wound. The contiguous portions of bowel above and below the fistula were freed and bowel divided across. The open ends of intestine were then sutured as follows: "The muscular coat being retracted with the finger-nail, the mucous membrane only was first united by a continuous silk suture in its whole extent: the muscular and serous coats were then inverted and their opposing peritoneal surfaces united by interrupted fine silk ligatures passed on each side through the two outer coats and then drawn together, an ordinary straight, round sewing needle being found most convenient. In addition, some sutures were passed beyond the actual opening in the gut, which was thus freely closed by about 20 or 30 closely-placed stitches." The peritoneum was then sponged and the intestine returned free into the abdominal cavity. The wound was closed, leaving room for a drainage tube over the bowel. The operation lasted $2\frac{3}{4}$ hours; for 5 days only water and opium were allowed; then nutrient enemata, and on the 10th day peptonized beef tea by the mouth. Pus came by the track of the tube on the 2d day, and a little bile on the 4th. This continued till the 10th day, when one of the silk sutures was discharged; and a few days afterwards the wound healed. Bowels were moved by enema on the 12th day, and the patient soon made a good *recovery*.

Mr. Bond in future would prefer an opening for artificial anus parallel with the long axis of the bowel—not transverse to it. He believes

that the success of the intestinal suture was partly due to his being able to leave the mesentery untouched, and that the giving way of the stitch was owing to thinness of the gut where it had been adherent.—*Lancet*, April 9, 1887.

CHAS. W. CATHCART (Edinburgh).

IX. Complicated Diseases of the Pancreas and their Surgical Treatment. By KARL HAGENBACH (Basel). The author records two cases, one of hematuria and another of carcinoma of the pancreas. The literature of diseases of the pancreas is studied at length. The number of operated cysts of the pancreas now reaches 13. Of 15 cases tabulated by the author 8 were males; the ages varied from 16 to 46 years. The duration of the disease is chronic and in some of the cases the symptoms extend over a period of five to twelve years. The prominent symptoms in all cases were oppression or pain in the epigastrium, eructations, vomiting, irregularities of the bowels, and extreme emaciation. With all this there was a tense, elastic tumor in the upper abdominal region with pseudo-pulsation. Küster lays stress on the presence of a moderate amount of blood in the exploratory puncture of such tumors. This last element speaks for the presence of pancreas cysts. In Küster's case a venous hemorrhage into the cyst probably followed the exploratory puncture.

Hæmatoma (Friedreich) of the pancreas is relatively common (hemorrhagic cysts of Senn). The apoplectic cysts (Friedreich) (hæmatoma of Senn, are rarest occurrences. The apoplectic cysts have until now been found only post-mortem.

Closely allied to the apoplectic cysts both clinically and genetically are the diffuse hemorrhages into the tissues of the pancreas. The symptomatology of the hemorrhagic pancreas cysts is in no wise a characteristic one. In one case the sudden onset of vomiting of blood caused a fatal result. In another case the appearance of blood in vomited matters and dejecta were the only symptoms. In other cases even the above were absent, and the diagnosis was not made ante mortem.

The prognosis of hæmatoma is bad; the patient dies of hemor-

rhage, or the increasing size of the tumor, or from pressure effects on adjacent viscera. The most successful treatment thus far (Thiersch and Gussenbauer) has consisted in incision, drainage or tamponade. Stenosis of the intestine in diseases of the pancreas may result from pressure of the morbid growth in rare cases. The cases result fatally, as a rule. Laparotomy fails to relieve the patient supposed at the time to be suffering from strangulation of the gut. Post-mortem alone reveals the true cause of death. This rare cause of ileus has received comment at the hands of Gerhardt (*Virchow's Archiv.*, bd. 106, h. 303). In the author's twelve tabulated cases, nine proved fatal through compression of the gut by the growth. In another case the fatal result was caused by a hemorrhage from an ulceration of the duodenum. The diagnosis was not positively made in any recorded case before death. In all the cases where laparotomy was performed for the relief of symptoms of intestinal obstruction (3) death resulted. In cases of compression of the common gall duct by pancreas carcinoma, the author advises the formation of an artificial biliary fistula.—*Deutsch. Zeitschrift f. Chir.*, bd. 27, heft 1 and 2.

HENRY KOPLIK (New York).

X. Case of Pancreatic Cyst Treated Successfully by Incision and Drainage. By WILLIAM T. BULL M.D. (New York). A man, æt. 46, had a history of soreness and tenderness in the region of the liver, with the appearance of a tumor growing for ten weeks without pain, when after an attack of abdominal pain and diarrhœa, with very dark stools, the tumor disappeared. It reappeared after three weeks and increased in volume for six months, when it remained stationary for a month, at which time it came under observation. Physical examination excluded ascites, aneurism, hydro- or pyonephrosis, and established the fact that there was a retro-peritoneal tumor, as shown by its relations to the stomach and colon; the absence of hooklets and the hydatid fremitus excluded in all probability an echinococcus cyst of the liver, and malignant diseases of the suprarenal capsules or pancreas was excluded by the evident cystic character of the growth. The history of inflammation of the bile duct fol-

lowed by the appearance and rapid growth of the tumor, with subsidence with dark colored stools, and its reappearance and rapid growth, together with the character of the contents drawn off with a hypodermic syringe, indicated a pancreatic cyst. An incision was made extending four inches upward from just above the umbilicus; the omentum was torn through and the cyst wall exposed and stitched to the lower part of the wound, the upper part being closed. Seven days later the cyst was opened with the Paquelin cautery without anæsthesia and without pain, drains inserted, and the wounds dressed. The cavity gradually closed up until he was discharged from the hospital—seventeen weeks later—with a sinus only two and a half inches deep and a few drops of secretion daily. Two weeks thereafter he died at his home in the country from diabetes. A detailed analysis of the cyst fluid is given. This case is of interest in connection with the researches of Senn (*ANNALS OF SURGERY*, Vol. ii, p. 272).—*N. Y. Med. Jour.*, Oct. 1, 1887.

XI. Case of Splenectomy for Floating Spleen. By JAMES McCANN, M.D. (Pittsburg, Penn.). A woman, æt. 29, had suffered for six years from a movable abdominal tumor associated with attacks of severe hæmatemesis at intervals varying from ten days to a year in length. She had never had ague, but was in a condition of extreme anæmia. The tumor, on palpation, was found to be 5 by 7 inches in size, rather more than semi-solid in consistence, and, though preferably occupying the left iliac region, to be movable into any part of the abdominal cavity. After three weeks tonic treatment, laparotomy in the median line exposed the tumor which was recognized to be the spleen and which was extensively adherent to the omentum. Considerable hemorrhage proceeded from these adhesions giving way and from rupture of the splenic capsule, but the pedicle of the gland was secured with a carbolized silk ligature, all bleeding checked, the stump left in the cavity and the abdomen closed with deep interrupted silver sutures, including the peritoneum. The patient rallied well from the operation, but final recovery was retarded by an attack of phlegmasia

alba dolens, her discharge from hospital occurring 33 days after the operation.—*Am. Surg. Assn.*, 1887.

JAMES E. PILCHER (U. A. Army).

XII. Chylous Cyst of the Mesentery. By Dr. F. BRAMANN (Berlin). The author reports a case of chylous cyst of the mesentery operated on in Von Bergmann's clinic. He discusses the clinical aspects of these tumors. The rarity of these cases in literature is probably due to the fact of a failure to recognize their true nature. The diagnosis in author's case was not made until after operation. Complete extirpation of the cyst was impossible on account of its intimate connection with the coils of the small intestine. It was incised and seven to eight hundred grammes of fluid of a milky character and slightly alkaline reaction were obtained. There were no clots in the fluid and microscopically there were detritus granules, lymph corpuscles, blood cells, colostrum crystals and fat in exceeding fine subdivision. There were no epithelial scales. With acetic acid and heat there was complete coagulation. The cyst was smooth on its interior, covered externally by peritoneum, no endothelium or epithelium internally. The wall was made up of connective tissue, rich in blood and lymph vessels. The edges of the incision in the cyst were sewed to the abdominal wound and a drain inserted. The patient was discharged cured after 5 weeks. There was no disturbance of nutrition on account of loss of chylous fluid, of which there was no discharge after the emptying of the cyst. A stenosis or obstruction of the thoracic duct is an etiological factor in most cases. Yet in some cases where this obstruction was present there was only a dilatation of the lymphatic trunks (receptaculum chyli, etc.). In these cases it may be that the thoracic duct exists double or has an anomalous course. In other cases it empties into a vena azygos or lumbar vein. The etiology in the author's case is obscure. While at first there may have been an obstruction to the flow of chyle or lymph, this was not apparent later. At time of operation the lymphatic vessels of the intestines were not dilated. There was, perhaps, no communication left with the lymphatic channels, the discharge of lymph after incision of the cyst being nil. In cases of cyst. congen. colli and others of a like nature at first there is a supposed communication with the lymphatic

system, but later on, for some reason, this is suspended when the cyst has grown in size and pressure has increased. It is not known whether the cyst wall is capable of secreting the cyst contents, for there is no epithelial or endothelial lining, and Grawitz' explanation for small peritoneal cysts does not hold here. The origin of the cyst from a lymph gland (Rokitansky) is also excluded. The author concludes that the cyst may have originated from a dilatation of the receptaculum chyli or from a lympho-cavernom or angiom (subperitoneal) similar to those cases recorded by Virchow.—*Arch. f. klin. Chir.* bd. xxxv, hft. 1.

HENRY KOPLIK (New York).

XIII. Perforation of the Appendix Vermiformis. By J. MC F. GASTON, M.D. (Atlanta). From a careful inquiry into the pathology, diagnosis and treatment of this accident, the author concludes: (1). The primary disorder is dependent upon a local irritant, either mechanical, chemical or vital, inducing ulceration and disintegration at some point in its walls. (2). The modification in the tissues of adjacent parts depends upon the presence of a toxic exudation from its cavity that ultimately leads to disorganization of structure. (3). Extension of the degenerating process depends upon the permeation of the structures with fæcal matter, but may result from suppuration, or the automatic propagation of the inflammation from one part to another. (4). Agglutination between the layers of peritoneum may shut in purulent accumulations and thus limit the inflammatory action to a circumscribed area so as to assume the nature of an abscess in that locality. (5). General peritonitis may be accompanied by extensive adhesions of the adjacent serous membranes and followed by vital prostration and collapse, calling for the knife. (6). Septicæmia may occur from absorption of septic matter independent of suppuration, and associated with a low form of fever which ought to be treated by antiseptics and irrigation of the abdominal cavity by hot water. (7). When there are sufficient evidences of perforation in the general symptoms, with pain and tenderness on pressure over the cæcal region, without signs of fluctuation, an exploratory puncture below the ileo-

cæcal junction is warranted. (8). If there are any reasonable grounds to believe that pus is present, or that there is extravasation of fæcal matter, whether from perforation of the cæcum or appendix, a free incision above Poupart's ligament should be carried down to those parts and drainage kept up afterward. (9). In perforation of the appendix associated with general peritonitis, an incision in the linea alba affords the best prospect of reaching all the parts involved, and should be accompanied by thorough cleansing of the abdominal cavity, and especially of the ileo cæcal region. (10). The most efficient means of closing an opening in the cæcum is by Lembert's suture, while an opening in the appendix demands excision and ligature. (11). When perforation is suspected, washing out the abdomen by the use of a syringe and two tubes, will assist in the diagnosis and treatment. (12). An early operation with a doubtful diagnosis of perforation of the appendix lessens the likelihood of a confirmation of it by a necropsy, and hence no time should be lost in awaiting developments.—*Jour. Am. Med. Assn.*, Aug. 27, 1887.

XIV. Laparotomy for Stab Wound of the Abdomen.

By JOSEPH M. FOX, M.D. (Philadelphia). Three cases are related: (1). A man, æt. 32, had been stabbed with a pen knife*making a wound $1\frac{1}{4}$ inch in length, parallel with and one inch below the lower border of the ribs and one to one and a half inches to the right of the median line. Three and a half hours later, the wound was extended to the median line and downward, making an incision five inches in length. A wound of the right lobe of the liver, three-fourths inch long and one-half inch deep, was touched with the Paquelin cautery, the abdominal cavity cleansed and the wound closed. *Death* ensued after twenty hours, due to loss of blood and low physical condition from dissipation. (2). A man, æt. 28, had been stabbed with a pen knife about two inches above and one inch to the right of the umbilicus, and also two inches to the left of the sternum. Enlargement of the abdominal wound revealed no visceral injury and the wounds were all closed, the protruding omentum having been tied and excised. The patient reacted poorly: inflammation of the lungs set in, followed by empyema from which *death* occurred on the thirty-fourth day. The

autopsy revealed a good result with the abdominal wound. (3). A man, æt. 25, received a stab wound one and a quarter inches in length, 5 inches to the left of and $\frac{3}{4}$ inch above the umbilicus, and a mass of omentum protruded. Examination through the wound revealed no visceral lesion; accordingly, the omentum was ligatured and excised and the wound closed, *recovery* following on the twelfth day.—*Med. News*, Nov. 12, 1887.

XV. Laparotomy for Stabwound of the Abdomen. By M. H. RICHARDSON, M.D. (Boston). A woman, æt. 23, received a stabwound of the abdomen a little above and to the left of the umbilicus; omentum protruded from the wound. An exploratory operation was then performed, under antiseptic care, by enlarging the wound five inches to permit a prolonged and careful examination of the intestines. No injury having been found, the external cut was sewn up, and the patient allowed to progress to *recovery*.—*Boston Med. and Surg. Jour.*, Sept. 8, 1887.

XVI. Laparotomy for Gunshot Wound of the Abdomen. By JOSEPH M. FOX, M.D. (Philadelphia). A man, æt. 18, was shot with a pistol one and a half inches to the left and one-half inch below the umbilicus. Three and a half hours later, under ether anæsthesia, a median incision from two and a half inches above to four inches below the umbilicus was made, disclosing considerable blood in the abdominal cavity. The bullet had passed through the omentum near its attachment to the transverse colon, through the transverse colon, then through the jejunum near its beginning, and lastly through the mesentery of another coil of jejunum; finally lodging, it was thought, in the muscles of the back to the right of the spine. The four intestinal wounds were closed with about twenty-five silk Lembert sutures; the mesenteric wounds were also closed with silk. No fæcal extravasation occurred, although there was considerable discharge of gas and blood from the wound of exit in the jejunum while it was being stitched, but this ceased when the sutures were tied; some bleeding also occurred from the omental wound, controlled by ligature, and from some deep point in the back, but he trusted to pressure of the

abdominal wall to check this. A recent invagination of the ileum about one inch in extent was discovered and reduced. During the operation the guts were wrapped in towels wet with a warm sublimate solution. The operation lasted one hour and ten minutes. The patient rallied well from the operation, and progressed to a final *recovery*, one month later.—*Med. News*, Nov. 12, 1888.

XVII. Laparotomy for Gunshot Wound of the Abdomen. By ISAAC WARREN, M.D. (Somerset, Ky.). A man, *æt.* 18, received a 38-caliber pistol-shot wound on the left side about midway between the umbilicus and the anterior spinous process of the ileum. Twenty-four hours later, in a wretched log hut with the temperature without only 5° F. (which made it impossible to get the temperature of the room above 70° F.), under antiseptic precautions, the abdomen was opened by an incision in the median line from the umbilicus to the symphysis. A general peritonitis existed, and five wounds of the small intestine and two of the mesentery were found, which were all closed, Lembert's sutures of carbolized silk being used for the former. The operation lasted an hour and three-quarters, and, although the patient recovered consciousness, *death* from exhaustion followed in fourteen hours.—*N. Y. Med. Jour.*, Sept. 17, 1887.

XVIII. Laparotomy for Gunshot Wound of the Abdomen. By A. S. PRIDDY, M.D. (Keysville, Va.). A negro man, *æt.* 60, received a 32-caliber pistol-shot wound about one-half inch below the anterior superior spine of the ileum toward the abdomen. Entrance into the abdominal cavity being doubtful at first, expectant treatment was employed until the fourth day, when in a poor negro cabin, but with careful antiseptics, an incision was made in the median line from the umbilicus to the symphysis. The descending colon was lacerated longitudinally for more than six inches, extending into the sigmoid flexure; the meso-colon was perforated and the jejunum contused by the spent ball and there was but slight fecal extravasation. The wounds were closed with catgut sutures and packed with iodoform and the abdominal cavity cleansed, after which the abdominal incision was brought together and drainage was established, the operation occupying fifty-five minutes. In spite of great exhaustion, the patient reacted well and progressed satisfactorily to a good *recovery* in six weeks.—*Jour. Am. Med. Assn.*, Nov. 19, 1887.

JAMES E. PILCHER (U. S. Army).

XIX. Empyema of the Gall Bladder and its Surgical Treatment. By Dr. M. HIRSCHBERG (Frankfort a. M.). Dr. Hirschberg records a case of empyema of the gall bladder occurring in a female æt. 44. The patient was operated upon with successful result. In the remarks on the case the author finds that in most cases of empyema or hydrops of the gall bladder the appearance of any tumor has been preceded for years by attacks resembling biliary colic, but in most cases there was absence of jaundice. This absence of jaundice is explained by the fact that the cystic is narrower than the common duct and the most severe attacks of colic point to a stone fixed in the cystic duct. The milder attacks with jaundice point to a stone fixed in the common duct or its passage through the same. Patients complain for a long time of a dull pain in the right hypochondrium. Fever may be entirely absent. The urine is free from pus if pyonephrosis does not also exist. Physical examination of the abdomen discovers a smooth, tense, elastic tumor, movable from side to side, diminishing in size toward the liver. It is not connected with the abdominal parietes. A coil of intestine may lie over the tumor which is painful to pressure. The patients complain of pain in the left shoulder. Puncture gives a purulent fluid containing biliary constituents. Particularly is the diagnosis to be made from pyonephrosis. It has been most often mistaken for the latter condition. Inasmuch as operative interference is indicated in both diseases, we will perhaps find our way best by an exploratory incision made according to the author in a transverse direction. Operative procedure is indicated in (*a*) chronic lithiasis, and (*b*) retention cysts of the gall bladder due to stoppage of the cystic duct by a stone. Especially is empyema included here. Operation is not advisable at a time when a calculus is supposed to be passing the common duct, the time should be chosen when it has passed into the intestine. The continued menace to life by a lasting closure of the common duct by stone may be warded off by a fistula of the gall bladder. If in the latter case the constant loss of bile should so affect the economy as to threaten life, cholecystoenterostomy is a justifiable operation. Cholecystectomy is indicated in long standing formation of biliary calculi. It here stands as a rival to cystotomy.

HENRY KOPLIK (New York).

ON A CASE OF SUBCRANIAL HÆMORRHAGE TREATED BY SECONDARY TREPHINING.

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ON Thursday, June 16, '87, a laborer, named Patrick Rourke æt. 50, of robust habit and sanguine temperament, was received into the Richmond Hospital. He was reported to have been drinking heavily up to the Sunday previous to his admission, and on that day to have fallen off a cart and sustained such injury that he became insensible. No accurate history of his condition between the Sunday and Thursday could be obtained, or no hint as to whether his fall was the result of previous loss of consciousness, or his loss of consciousness incident on his fall. The possibility of violence having been used was present, and was supported by the apparent disinclination of those who had been in contact with him to give information. The most we could gather of his condition during the interval between his injury and his admission to hospital was that he had been more or less stupid, and apparently suffering from the effects of his previous debauch.

This absence of any reliable history complicated the difficulties of the case, and was one of the reasons why operation was delayed so long.

At the time he came under observation, on the fourth day after the accident, his condition was as follows:—He was in a state of stupor, from which he could easily be aroused, when he made slow but sufficiently intelligent answers. His pupils were of average size, symmetrical, and fairly responsive. He had very slight partial paralysis of his left facial nerve, with

the usual protrusion of the tongue to that side; there was partial motor paralysis of the left arm, and a barely detectible motor insufficiency of the left lower extremity. He swallowed well, and his speech, though thick, was quite intelligible. There was no sensory paralysis.

On his head being shaved and examined, a bruise was found on the right side of the cranium, 25 mm. from the mesial line, on that part of the scalp which would correspond to the upper part of the fissure of Rolando. It was about 20 mm. in diameter and indurated round the edge, so that it was not possible to say whether a depressed fracture existed, or merely a ring of hardened blood-clot. In consultation it was determined to delay operative treatment pending the persistence or farther development of symptoms, as there was not sufficient evidence as to whether the cerebral pressure present might not be apoplectic.

On the next day there was but little change, except that stupor was more marked; but on that following, the sixth after the fall, there was considerable change for the worse. He could with great difficulty be aroused. The breathing was stertorous. The right pupil was slightly larger than the left. The paralysis of the left arm was nearly complete, while that of the lower extremity, though incomplete, was more evident than at first.

On the next day, June 19, the seventh of the case, his condition was rather improved; but on the night of the eighth day he got rapidly worse, and when I visited him on the morning of the ninth day after the accident, his state was as follows:—The face and extremities of the left side and the bladder were completely paralyzed. The pupils were symmetrical, and, without being actually dilated, were rather over medium size. He was in a state of profound coma, and the automatic act of swallowing was performed in the case of small quantities of fluid with marked slowness and imperfection. The breathing was slow, 12 to 14 in the minute, and was stertorous and diaphragmatic. The temperature, which had previously been at or about the normal point, except on the sixth day, when it went up to 100° , had fallen to 98° ; and the pulse, which had for some days been gradually increasing in

frequency, had risen to 110. The man was evidently failing rapidly, and would die soon if unrelieved.

Looking at the entire view of the case, in spite of its obscure history, I came to the conclusion that the symptoms were probably due to hæmorrhage between the bones and dura mater, dependent on a laceration, with or without fracture, of the middle meningeal artery. Although there had been, so far as we could ascertain, no complete recovery between the injury and the advent of the later symptoms of pressure, and therefore an absence of that interval which is so characteristic of subcranial hæmorrhage, yet, on the other hand, there had not been that even level of ills, or that uniformly downward path of symptoms, indicative of laceration or apoplectic pressure on the brain.

The reading of the case, as expressed at the time, and fully borne out by its subsequent history, was this:—

1. Hæmorrhage over the right motor area, between the bone and dura mater, probably due to laceration of the middle meningeal artery or one of its branches, most likely associated with fracture, and producing the partial left paralysis which at first existed.

2. Subsequent increase of the hemiplegia, either due to renewed hæmorrhage, or to that sudden yielding of brain function which is repeatedly seen both in hæmorrhages or serous effusions which have existed for some time, even though no additional mechanical pressure is called into play.

Let us examine the reasons for these conclusions.

The existence of the scalp injury over the upper and back part of the motor area was of less value in indicating the seat of pressure than the opposite paralyses, which pointed clearly to the engagement of the greater portion of the right motor area, including the extensive surface occupied by the cortical centres for the various parts of the upper extremity, the face and tongue, and lower extremity, the interference with them being in the sequence in which I have written them. Remember, in this context, the statement of MM. Charcot and Pitres (*Revue de Médecine*, October, 1883), more lately repeated and endorsed by Ferrier, that "there does not exist a single accurate observation of a destructive lesion outside the motor

area having produced permanent paralysis; nor does there exist a single accurate observation of a destructive lesion of any extent of the ascending convolutions which has not given rise to permanent paralysis of the opposite side of the body."

The dilatation of the pupil on the same side of the cerebral lesion is the condition most usually found, and the disappearance of the mydriasis when the other pressure symptoms became aggravated is but an example of that compensation derived from the centres of the opposite hemisphere, as shown by the law of Broadbent, which teaches that "one-sided movements are represented in both hemispheres, and can be excited from either, in proportion as they are habitually associated on the two sides" (Gowers). The eyes have an intimate association of action which would cause this rule to apply to them more strongly than to other parts.

As to my assumption that the pressure was cortical, and not apoplectic, it was founded on my belief in the absence of any sensory paralysis, and the teaching on that point, so well expressed by Ferrier, who says that "Strictly cortical lesions of the motor area do not cause anæsthesia in any form, and it may be laid down as a rule, to which there are no exceptions, that if anæsthesia is found along with motor paralysis, the lesion is not limited to the motor zone, but implicates also, organically or functionally the sensory tracts of the internal capsule or the centres to which they are distributed." The cortical nature of the pressure was farther supported by the existence in the early stage of the case of a pronounced brachial monoplegia, as it is well established that monoplegia is a condition due to interference with the cortex and not usually found in more deeply situated lesions.

The impeded functions of the respiratory centre and pneumogastric nerve, as evidenced by the increasing rapidity of pulse, the diminishing frequency of respiration, and the extreme difficulty of swallowing, were believed to be due to pressure on the medulla from above, rather than to any direct blood-pressure on the origins of the nerve, as, if blood had found its way so far as the under surface of the medulla, it would most likely have penetrated to the spinal canal and so relieved its pressure effect on the pneumogastric origins; be-

sides, the late and gradual advent of the pneumogastric symptoms was more likely due to cumulative pressure from above than to so late a secondary hæmorrhage as this should be, were it the direct cause of pressure, remembering that the medullary impediments did not exhibit themselves until the ninth day after the injury. This was rather an important point in determining operation, as a surgeon would naturally be slow to use the trephine if he believed basic extravasation to have taken place.

Considering the whole story of the case, and in view of the inevitable death of the patient if not relieved by treatment, it was determined to trephine him. This was done June 21, the day on which he exhibited the pronounced conditions just described, and the ninth after his accident.

The patient was completely comatose, and no anæsthetic was used. Taking the injury over the fissure of Rolando as the point indicated for operation, because, although not in the centre of the engaged portion of the motor area, a possible fracture existed there, two incisions were made, one downward and outward behind it, the other running horizontally forward, so as to include a rectangular flap. The scalp and pericranium were raised together, and the bone found to be free from any appearance of injury. A trephine, with a diameter of 26 mm., was applied, and on the disc of bone being removed, the antero-inferior edge of the opening disclosed the edge of a well-formed blood-clot, evidently reaching downward and forward over the parietal area. The incisions were extended, so that each measured 60 mm., and a second trephine opening was made immediately below and in front of the first. The projecting tongues of bone between the two openings, which ran into each other, were then cut off with a bone-forceps, and an oval opening measuring 52 mm., rendered available for removing the clot. This was effected by a director, the finger, and a current of sublimate solution, and a cavity between the bone and dura mater emptied, which was circular in outline, covered all that portion of the motor area which lay anterior and inferior to the trephine hole, and was at least 90 mm. in diameter; at its centre the clot was so thick that the dura mater was distant from the cranium about 40

mm. When this stage of the operation was completed, the dura mater began to rise towards the cranial wall, so that when the wound was sutured it was within 6 or 7 mm. of it. Signs of returning brain power at once showed themselves, and before the patient was taken off the operating table he moved his left arm and leg with tolerable freedom, asked for a drink of water, which he readily swallowed, and gave vent to some rather bad language.

Some little oozing of fresh blood took place, but gave no trouble. Strict antiseptic measures were observed; the solutions were of corrosive sublimate, 1 to 3,000, and the spray carbolic acid. The wound was sutured, except at its angle, where a drainage tube was inserted, and dressed with sublimated gauze and iodoform cotton. The dressing was changed daily, the drainage removed on the third day after operation, and the sutures on the fourth. An uninterrupted good recovery was made, pus appeared freely on the sixth day, but without any odor, and continued to be discharged for two weeks longer, when the discharge ceased, and the wound closed. The temperature, which was 98° on the morning of operation, rose on four occasions during the ensuing ten days to 100° , but, for the rest of the time the man was under treatment, was practically normal. The evening of the day of operation the paralysis and brain symptoms had all but disappeared, and he could pass water voluntarily. A day later he was in a perfectly normal condition as regards any brain symptoms. He was kept under observation until September 20, when he left hospital. He again presented himself on November 10, when he had a sinus discharging at the angle of the original wound. I received him into hospital, and the next day removed a small fragment of bone from the trephine hole. It had evidently been separated from the inner table, and showed clearly from its form that a fracture of the vitreous table had existed. The sinus has since continued to discharge a gradually diminishing amount of pus, but I cannot find denuded bone, and his excellent general health is in no way impaired.

If another case, resembling this in the extensive separation of the dura mater from the bone, offers itself for treatment, I will be disposed to make one addition to the methods here

employed. That is, if a drain should be necessary, I will consider the propriety of making it as efficient as possible by forming a small trephine opening at the nearest accessible point to the lower edge of the line of separation between the cranium and dura mater. The more perfect drainage thus afforded would, I believe, promote the healing of the cavity, and lessen the risks of suppuration, by offering a free and depending exit to pus or any other fluid present.

The case had some features of great interest. Not the least among these is the lesson it teaches as to possibility of making an accurate diagnosis, even in an instance so obscured by want of definite history as this was. There is nothing more clear than the justice with which Mr. Hutchinson, in his "Lectures at the London Hospital," points to the enormous difficulty which often exists in distinguishing compression, from laceration of the brain due to one cause or another. I escaped this dilemma and was able to arrive at a conclusion justifying a useful operation by two circumstances—first, that I could, independent of any knowledge of a fracture enabling me to localise the hæmorrhage, put my finger over the motor area and say with sufficient accuracy, "there is pressure here over the cortical centres for the upper extremity; it extended downward and forward to those for the face; it afterward reached upward to those for the lower extremity." The sequence is anatomically perfect. First a brachial monoplegia: then, as the blood or pressure effect extends, a facio-lingual; and finally, a crural paralysis. Again, I was justified, using the knowledge of the fact that cortical lesions of the motor area do not cause anæsthesia in any form, and that no loss of sensation was present here at a time when the condition of the man permitted that fact to be tested, in assuming that the pressure was probably between the dura mater and bone; a decision to which I was farther helped by the monoplegic condition which at first was present. To what, I ask, do I owe the knowledge on which this judgment was founded? Largely to the humane and benevolent investigations of those biologists whom weak, credulous, or mistaken people are actively pelting with the verbal filth of prejudice and ignorance—people who would prefer that this man, formed in

the image of his Maker, should die, rather than their feeble sentiment be offended by a painless experiment on an ape.

Another point of interest is the very large size of the clot which was present, and the late development of the grave symptoms which were producing death. The clot was so uniform in color and consistence that I am persuaded it was all the result of primary or intermediate hæmorrhage, and that the failure of brain power on the ninth day was due, not to added pressure, but to the increased intravascular tension due to the vascular spasm produced by irritation of the sensory nerves or their centres, which, as Duret has shown, can destroy life before the amount of extravasation is reached which is capable by itself of producing a fatal disturbance of cerebral function.

As bearing on localisation of function, this case has an interest beyond the corroboration it affords to what is held concerning the seat of the cortical centres for the various parts of the upper extremity, and the situation of that facio-lingual area. It helps to prove what is generally believed as probable, that the centres for the leg do not extend behind the fissure of Rolando into the superior parietal lobule at the point indicated by Ferrier as No. 1 area. I have made the most careful measurements of this man's skull, both by the method of Reid and Thane, and I am satisfied that the centre of the upper trephine hole covered exactly the superior part of the fissure of Rolando 25 mm. from the median line. If it be remembered that the clot was found to extend downward and forward from the lower margin of this opening, it will be at once seen that it did not at its postero-superior limit approach within 10 mm. of the anterior edge of the fissure, and that the superior parietal lobule could not have been directly engaged. If it be urged in answer to this that the pressure producing the effect might be remote, it may be replied that in this case the remote pressure effect, that on the medulla, which undoubtedly did exist, seemed to expend itself downward in the direction of gravity, as might naturally be expected.

Independent of these points, the case, as one in which no defined bone lesion served to localize the hæmorrhage, belongs to a class sufficiently rare to deserve notice. If I required any

other apology for presenting it at such length, I would have it in the words of so eminent a surgeon as Mr. Hutchinson: who says, speaking of instances of effusion of blood between the bone and dura mater—"These are especially important, because generally supposed to be capable of relief by treatment. Yet it is a remarkable fact that the modern annals of surgery do not, so far as I am aware, contain any cases in which life has been saved by trephining for this state of things" ("Clin. Lect. Lond. Hosp.," 1867-68). The present is but one of two instances which have come under my own notice. In the *Med. Press and Circular* of Dec. 17, 1879, Mr. Thomson communicated the case of a child whom he had trephined in the Richmond Hospital during the early part of that year for primary subcranial hæmorrhage over the right parietal region, and who made an excellent recovery. There are others recorded, for I find in Ashhurst 40 cases collected, several of which have occurred within the last 20 years. Of these, 24 recovered and 16 died; 22 of the 40 were primary operations, and of these 8 proved fatal; 19 were secondary operations, and of these 8 recovered.

The lesson of this case has impressed itself deeply on my mind; for, in other practice as well as in my own, I have seen instances in which life might, as I now believe, have been saved by operation such as this. In one case in particular, where a trephine hole was made by one of my colleagues, it was proved afterward that the opening barely escaped the discovery of a clot, which a greater knowledge of localisation than we then possessed, and a second perforation, would have enabled us to discover and remove, with the probable effect of saving life.

On a careful study of the light which modern investigation has thrown on the localisation of intracranial pressure, and the security which modern surgical methods have given to the operation of opening the cranium, and bearing my clinical observation of deaths from doubtful intracranial accidents in mind, I have come to this conclusion for future guidance—that *if I am in doubt I will operate*; that whether I believe the blood to be subcranial or subdural, I will not, so long as evidence of such constitutional disease or local condition as

points to apoplexy is absent, allow a patient to die without giving him the chance of escape from a fate which appears inevitable if the surgeon holds back. Why should we hesitate to open the dura mater even if the bleeding be arachnoid? Are not the numerous cases which exist, of recovery when the brain has been exposed and extensively lacerated, sufficient answer to the policy of hesitation?

SOME POINTS ON INCARCERATED HERNIA.

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FOR many years the subject of incarcerated hernia has engaged my attention, not only because of its difficulties, but also because of its intrinsic interest: That it is a difficult subject, no one who has any knowledge will deny; and that it is of interest, any one will admit who considers the important field it offers for practical study. And it has seemed to me that it would not be out of place to occupy a little time with the consideration and the discussion of some of the difficulties of this form of hernia. And then I may be permitted to bring forward a few cases in illustration of my views and opinions, in regard to some of the most difficult questions of surgical practice.

In the first place by way of definition, let me say that an incarcerated hernia involves two essential conditions: 1. It must be irreducible: 2. It must be obstructed. These two conditions are essential and necessary in a case of incarcerated hernia. If a hernia can be reduced, then in no sense can there be an incarceration. I am now speaking of the power of taxis, such power as is possessed by the practiced surgical hand. And then I am led to say that a hernia is irreducible when with the skill of experience it can not be reduced. And then the condition of obstruction implies and involves the in-

testine, which must to some extent constitute part of the contents of the hernial sac. And the part of the intestine that is in the sac must be obstructed. And so we have the condition of the bowel that we call obstruction: and this obstruction is complicated with irreducible hernia. An incarcerated hernia is therefore an obstructed irreducible hernia.

And now comes the question: what constitutes the irreducibility? Why is it impossible to put the hernial protrusion back? A hernia comes down, and is put back. This process of coming down and putting back may be repeated many times. Finally the hernia may increase in size, and may be left down, because it does not cause much inconvenience. It is comfortable, and the patient goes along unmindful of danger. In time the intestine, the sac and the peri-jacent tissues grow together, and it becomes impossible to reduce the hernia. Such a hernia may vary greatly in size. It may be no larger than a walnut, it may be larger than the human head. But it has formed such adhesions that no surgical skill can reduce it.

Time goes on, and the contents of the intestines pass, as best they can, through the irreducible knuckle that is bent up in the hernial sac, and this process keeps up from day to day—and from year to year. And then the neck of the sac may become smaller, and there may be an accumulation of fecal matter at the bottom of the intestinal knuckle, and then at last the hernial part of the bowels become obstructed, and so we have an incarcerated hernia.

The causes that facilitate and lead to the obstruction of an irreducible hernia are not difficult to find, and are easy to understand: granting the irreducibility of the hernia, and the fact that the hernial part of the intestine is obtruded through an aperture, and that it is grown to the sac, and that the sac is adherent to the tissues around it—and we have a part of the intestine that is deprived of its active function, for it can no longer go on with its peristaltic motions, since the fibers of the muscles are imprisoned, atrophied and destroyed. The irreducible part of the intestine acts as a mere passive tube, and that tube is bent upon itself. And so in time obstruction seems to follow as a matter of course. And yet we may look

on some cases in a somewhat different light. The hernia may be large; considerable intestine may be in the sac; it is still irreducible; the folds of intestine lie side by side, they are grown together with some firmness, they may not have lost entirely their power of peristalsis, yet the active function of the bowel is more or less impaired; then we have a condition of things liable to cause obstruction. In any case for a time the contents of the intestine are for the most part pushed through the impaired bowel after the manner of a *vis a tergo*. At last the time comes when the *vis a tergo* fails, or becomes incompetent, and then we have obstruction of the hernial part of the intestine, and incarcerated hernia.

Some years ago I operated on a lady about forty-five years of age, for what was supposed to be strangulated femoral hernia of the left side. On cutting down I found the perijacent tissues, the sac and the intestines one continuous structure, as it were, they having all grown together. The anatomical layers of hernia were not distinguished. The fold of intestine had not only lost its normal structure and function, but it was also obstructed. There was no strangulation. In fact, it was a case of incarcerated hernia. I incised the anterior wall of the femoral canal and cut the femoral ring, and liberated, as best I could, the irreducible knuckle of intestine, and then put it back, that is to say, I performed the major operation for strangulated hernia. And the result was that my patient died in a few hours after I had operated on her.

Did the operation improve the chances of recovery of this patient? The fact was death followed promptly and certainly. Would some other operation have answered a better purpose? Suppose I had made an artificial anus? Would life have been saved? Suppose I had exsected the damaged part of the intestine—what result might have been expected? It may be that some of these questions can have a rational solution. It may be that we can give them all practical answers before we finish.

On another occasion I went with the family physician to assist in an operation on a lady, about seventy years of age. I was told that she had been suffering for about a week with strangulated inguinal hernia of the right side. When I saw

this patient I found she had femoral hernia, and from the clinical history, I came to the conclusion, that the hernia was incarcerated, and I advised manipulation in order to remove the obstruction, inasmuch as an operation appeared to be very serious. Under ether the contents of the hernial part of the intestine were reduced, that is, the obstruction was removed. The fæcal matter was pushed forward into the lumen of the bowel, and some of the dislocated bowel was reduced, while the hernial sac remained where it had been for years, protruding from the femoral canal. This patient was relieved, so that with care she was comfortable for a number of years. Her hernia became incarcerated again, and was manipulated as before, with about the same success, in so far as the operation was concerned, but she died soon afterwards.

At another time I saw a patient, a strong man, about forty years of age, with the surgeon who had attended him, in order to assist in an operation for strangulation of an inguinal hernia of the right side. The hernia had existed for years, and had not been reduced for a long time. I found that the patient had symptoms of obstruction of the bowels, that the hernia was small, and that it could not be reduced. There were no distinctive signs of strangulation, and it seemed to me that the case was one of incarcerated hernia. Ether was given, and as taxis failed, an operation was performed. There seemed to be no anatomical difference in the tissues from the skin to the knuckle of intestine. Indeed, no sac of any kind could be found that was not continuous with the intestinal coats. And the knuckle of intestine had lost its normal appearance, and strongly resembled a specimen. It had no longer the properties of an intestine. This deformed and impaired piece of intestine was dissected from its surroundings and reduced, and the patient lived only a short time.

Now, what would have happened in this case, if the damaged structure had been exsected, so that the normal parts could have been joined, in order to restore a passage for the fæces? Seeing that the patient was in good condition, that there was no strangulation, that there was no gangrene, and that only a small part of the bowel was damaged, it was reasonably cer-

tain that an exsection of the hernial part of the intestine would have been better than a kelotomy.

The same day on which I assisted in the last case I saw a lady, whose physician said she had a strangulated hernia of the right side. He had been able to reduce the hernia at previous times, but now he had failed. The hernia had been down several days. I found the hernia a femoral one of the right side, the signs of strangulation were not present. I advised another attempt to reduce the hernia, the patient being put under the influence of ether. Then the case appeared to be one of incarcerated hernia, that is, the hernia appeared to be reducible only to a limited extent, and on gentle and continued pressure the obstruction was removed, so that the tumor was considerably reduced in size.

It was, however, deemed best to wait for developments. This patient did well, though there was some swelling, or tumefaction of the part left. The obstruction had been overcome, and it may be that some of the dislocated intestine had been reduced. Had this patient been operated on would she have died like the previous one? This is a fair question, yet who knows? Would it have been possible to safely exsect a piece of the dislocated intestine?

In January, 1888, a case of incarcerated umbilical hernia came under my care. The patient was a female, about forty-five years of age. The hernia had been operated on three years previous. The tumor had not been reduced entirely for about two years, it was larger at times, and then it would get smaller. The hernia had become irreducible, and a few days before I saw the patient the bowel in the hernial tumor was obstructed, and then the usual symptoms of intestinal obstruction presented themselves. I made every preparation for kelotomy, laparotomy, and exsection of the bowel. Ether was given, and then I gently manipulated the hernial tumor. As far as I could judge, there was no fecal accumulation in the intestinal folds of the hernia. It was not difficult to press out the fecal matter, so as to leave the sac which was adherent to the perijacent tissues, and so as to leave the intestinal folds which appeared to be attached to the inside of the sac. So complete was the removal of the obstruction, that I determined

to postpone operative procedures, and see if my patient would be in a better condition in a few days. The improvement was marked, the patient becoming quite well, so much so that she declined to have an operation.

A little more than a year ago I saw a case of incarcerated hernia that made a deep impression on my mind. The facts of the case are substantially as follows:

The family physician called me to see a lady, about fifty years of age, who had suffered for some years with a swelling in the right inguinal region. She had been seen at previous times by competent medical men, who said she had a hydrocele, or cyst. But the best opinion I could form was that she had an incarcerated inguinal hernia. I gave the patient an anæsthetic and obtained a reduction of part of the contents of the knuckle of intestine, and advised that nothing more be done by way of operation till the next day. However, another surgeon was called. He decided that the case was one of strangulated hernia, and urged an immediate operation. I was then sent for and was present during its performance. I administered the ether. The tissues were adherent and coherent down to the considerable knuckle of intestine, which had lost all appearance of being any part of the alimentary canal. I suggested that this deformed and damaged piece of the intestine be cut out, so as to bring the fresh ends of the tube above and below together. This might have given the patient some chance of life. This knuckle of intestine was put back into the abdominal cavity, where it was no more fit to perform a special function than it was while contained in the hernial sac. And it seemed to me that an attempt to form an artificial anus would have promised more good than the kelotomy with reduction. At any rate the patient promptly died the next day after the operation. Then I began to be more impressed with the gravity of a case of incarcerated hernia.

In October, 1887, I went to see a patient, about forty-five years of age, who was supposed to have a glandular tumor in the right inguinal region. The tumor had existed some fifteen years, and during this time nothing had been done for it. The patient had the symptoms of obstruction of the bowels, and I made a diagnosis of incarcerated hernia. Ether was adminis-

tered, and a moderate attempt at taxis was made, resulting in some relief. Two days after, consent to operate was obtained, and when a free incision was made gas escaped and fæcal matter was found in the tissues. The knuckle of intestine was lacerated; I completed the opening for the purpose of making an artificial anus. Fæcal matter came from the new passage, but the gangrene extended. The improvement was considerable for two or three days, and then the patient slowly sank from exhaustion. This patient was a gentleman who had been in active business for many years, and had concealed his infirmity from his friends, so that he was in extreme peril finally, because the hernia had become practically irreducible, and because there was no hope for him except by some kind of operation; and now I ask the question, would it have been better, if I had cut out a part of the intestine, instead of opening it? In a few moments we will consider this question.

A few days ago I saw a female patient, about thirty years of age, with her family physician. I found a swelling in the left inguino-femoral region nearly as large as one-half of the closed hand. She had been affected with this swelling since she was a girl, though it had been from the first quite small. About two-thirds of the swelling could be reduced, and what was left was quite firm. It appeared to be a direct inguinal hernia; some of it was reducible, and some was irreducible. The reduction, even if incomplete, gave much relief from the uneasiness and the distress suffered by the patient. The condition of things seemed to favor obstruction, which was removed by the manipulation. It was not possible to say whether the reduction, such as it was, accomplished the removal of the fæcal matter, or the knuckle of intestine from the hernial sac. One thing, however, is certain, and that is: This patient has been and will be in constant peril, and we may let her go on in the way in which she has been going, hoping that she may live a long time, under unfavorable conditions. Or, we may cut down on the sac and open it, and, if possible, replace the intestine, and try to get a radical cure. Or, if need be, we may cut out the damaged piece of intestine and stitch the cut ends together and attempt to get union, and so restore the function of the canal.

Now, I have given an account of a number of cases of incarcerated hernia, and what I have said indicates to some extent the nature of such cases, though it does not make clear some important points. The facts of irreducibility and obstruction have indeed been presented, and to them we may now briefly add a few more facts; we may speak of the facts of inflammation, strangulation and gangrene; we may say that an incarcerated hernia may be complicated by inflammation, strangulation or gangrene.

As a matter of fact, in a case of incarcerated hernia, inflammation may take place, and go on till death results, without the occurrence of strangulation or gangrene. I have seen two such cases, both occurring in women about fifty years of age. In each case there was a very large irreducible umbilical hernia that became obstructed; inflammation slowly supervened, involving the peri-hernial, the hernial, the intestinal and the peritoneal structures. I saw these two cases about a week after the inflammation began; no operation was performed, and death followed. In another similar case of inflamed umbilical hernia that had been incarcerated, an artificial anus was formed, and the patient survived for many years. In two other similar cases, in which kelotomy was performed, death followed in a few hours, life being evidently shortened.

In one of my cases previously mentioned, the one in which I endeavored to make an artificial anus, there was, no doubt, strangulation, that was followed by more or less inflammation, which was so intense as to produce gangrene. And when an incarcerated hernia becomes strangulated, gangrene will be very sure to follow, than which we could not well have a more disastrous condition in any surgical case. I admit that intense inflammation in such a case may lead to strangulation, while it is true that strangulation will produce inflammation, and both of these events may be followed by much dreaded gangrene. But so long as neither strangulation nor inflammation come to pass, in a case of incarcerated hernia, there is some hope of relieving the patient.

Let me add in this place that the condition of strangulation does not sufficiently and adequately describe an incarcerated hernia. Take an irreducible hernia, and let it become ob-

structed, and then let it become strangulated, and it is not fully indicated by saying that it is a strangulated hernia. The fact of irreducibility takes place before the strangulation, and the irreducibility is more or less chronic. On the other hand we may have: first, a new hernia become strangulated, so that it can not be reduced without an operation; second, an old reducible hernia may come down and become strangulated, so as to require an operation before it can be reduced. It is evident that both of these cases are different from a case of strangulated incarcerated hernia.

We may now take up some points in regard to the treatment of incarcerated hernia:

First. Relief by taxis.—Seeing that the pathological conditions that lead to incarcerated hernia are progressive, that late operations for this disease are more or less serious, and that our experience, in many cases both before and after obstruction, is in favor of taxis, we may safely recommend this method of treatment. And this recommendation has the more force because patients at present are very averse to operations for the radical cure of hernia. Now, what relief can be obtained by taxis in a case of irreducible or incarcerated hernia? In the first place, I have more than once known careful, gentle and persistent taxis adequately remove the obstruction that constitutes part of incarcerated hernia. The fecal matter has been pressed out of the knuckle of intestine, contained in the sac, so as to remove the urgent symptoms and save the life of the patient. Of course, if the obstruction is due to bands of adhesion, taxis, as any one can see, would be of very little use. It may, however, be stated that the failure of taxis to remove the obstruction would induce us to conclude that adhesions exist, or that inflammation has taken place. In the second place, I am reasonably certain that the knuckle of intestine can sometimes be partly reduced, and can sometimes be entirely removed from the hernial sac. I think that these results can be secured to some extent, not only in irreducible, but also in incarcerated hernia. It will then appear that in some instances the sac may be the irreducible part of the hernia; and then I am satisfied that even the sac may in some cases be partly reduced. Of course, if the sac and its contents

can be all reduced, we have not to deal with an incarcerated nor an irreducible hernia. The methods of taxis I would leave to the experience and judgment of the attending surgeon. In case of the failure of taxis, we must resort to some other plan of treatment—some form of operation.

Second. Relief by operation.—If, in a case of incarcerated hernia, taxis does not remove the obstruction, there is nothing left for the surgeon to do but to operate; unless, perhaps, there is so much inflammation, when he is called, that he may safely wait for nature to go on and form an artificial anus. Such a result has happened from time to time, and has left the patient alive. As I have already noted, I have seen a case of inflamed incarcerated umbilical hernia, in which gangrene occurred; an artificial anus was formed—and the patient lived for several years, when she died from an over dose of opium taken by herself. Yet even under the conditions named, it might be good practice to cut down to the gangrenous intestine, and open it, and let out the waste materials that have accumulated. In this way the surgeon might assist in the formation of an artificial anus, which might under some conditions be the only safe plan, especially when the peritoneal cavity had been closed by a wall of limiting fibrine. Indeed, the formation of an artificial anus may be the only thing we can do—at times—and even that may be accompanied by very imminent peril.

To illustrate the great difficulties that may be involved in an operation for incarcerated hernia, the facts of the following case may be related: A strong man, about forty years of age, had a large irreducible inguinal hernia of the right side. It had been down for years; at last there was obstruction, that was followed by inflammation. The sac was freely and extensively opened. The numerous coils of intestine had adhered to the sac, and had grown together. The peristaltic function had been almost completely impaired. And it was impossible to put the damaged coils of intestine back into the peritoneal cavity. Could this have been done, of what use would it have been? In fact, there was too much damaged intestine to be safely removed. After the operation, there was nothing to be done, except to see the patient die sooner than he would, if he had been let alone.

And yet, seeing that a case of incarcerated hernia, like one of obstruction of the bowel, if the obstruction is not relieved, must inevitably end in death, an operation is unquestionably justifiable. I am now speaking of a case that has not gone on to inflammation, or gangrene. And there are two points of special importance and interest in such an operation. One relates to the removal of the obstruction, in whatever form it may exist. The other relates to the disabled part of the intestine, the part that is imprisoned in the hernial sac. If the function of the imprisoned part can be restored, it may be reduced. If it is impaired by adhesions, or by change of structure, so that its peristalsis is lost, it may be exsected. Such an operation may give the patient some chance of recovery. And a small chance for life is better than the prospect of inevitable death without an operation.

In regard to the question of strangulation, serious as a case of incarcerated hernia may be, such a case when it becomes strangulated, as it sometimes does, turns out to be more serious still. The surgeon may ever bear in mind, that a case of strangulated incarcerated hernia is among the most serious of surgical cases; it will call upon him for all his skill, all his power and all his experience. One of two things must be done. The surgeon must assist in the formation of an artificial anus by carefully cutting down and opening the damaged intestine, in such a way as to leave the peritoneal cavity securely closed by the newly formed wall of limiting fibrine, and then wait to restore the lumen of the canal till a subsequent time, provided the patient survives the peril of his condition. Or he may proceed at once to open the abdominal cavity, according to the circumstances and requirements of the case, so that he can remove the waste material, make the parts aseptic, and cut out the damaged piece of intestine. Dangerous as this operation may be, the surgeon may have no alternative, for the patient without it will inevitably perish. And if the surgeon operates, we may not say, that the result was caused by the operation, but rather that the operation failed to save the patient's life.

In regard to the question of inflammation, we must keep in mind, that we have inflammation added to irreducibility and

obstruction. Does an incarcerated hernia require an operation? The requirements are more urgent, if it has become inflamed. Shall we cut through the inflamed tissues. Of the necessity of this I have no doubt. The patient will inevitably die, if we do not operate. We may save life, only we must be reasonably certain of our diagnosis. Exactly, what shall we do? Cut through the inflamed tissues down to the knuckle, or folds of intestine, contained in the hernial sac. This will deplete the engorged blood vessels; it will facilitate the removal of purulent infiltration; it will permit the application of disinfectants; and it will enable the surgeon to cut such adhesion bands as tend to cause strangulation,—and then one of three things may be done—reduction may be accomplished; exsection may be performed; or an artificial anus may be made. And in some cases the damaged intestine may be of necessity left where it is.

AN EXPERIMENTAL CONTRIBUTION TO INTESTINAL SURGERY WITH SPECIAL REFERENCE TO THE TREATMENT OF
INTESTINAL OBSTRUCTION.¹

(CONCLUDED.)

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9. OMENTAL GRAFTING.

UNDER the head of circular enterorrhaphy mention is made of transplantation of omental flaps after uniting the two ends of the bowel by suturing or invagination with a view of securing an additional safeguard against perforation during the

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process of repair. A number of experiments are described where the procedure was practised with satisfactory results. After a few days the omental flaps were found firmly adherent and vascular around the whole circumference of the bowel constituting a ring of living tissue outside the line of suturing. In all these cases the proximal end of the flap remained in connection with the omentum, and care was taken to cut the flap in such a manner that some vessel of considerable size should furnish the necessary vascular supply. I was well aware that plausible objections could be entered against this method in that the connecting bridge between the bowel and the omentum might become subsequently a cause of intestinal obstruction by making traction upon the bowel, thus causing a flexion, or, by becoming a band of constriction for some loop of intestine. For the purpose of obviating such remote consequences I resorted to another procedure which I have designated as omental grafting. I was familiar with the fact that implantations of aseptic substances into the peritoneal cavity had frequently been done without any immediate or remote ill effects, and I had every reason to expect that a large, completely detached aseptic omental graft, in an aseptic abdominal cavity, would be well tolerated, and would soon become adherent to the subjacent peritoneal surface, and thus afford an additional safeguard against perforation and the disastrous consecutive result—perforative peritonitis during the time required for the healing of the intestinal wound. In the following experiments the grafts used were from one and a half to two inches in width, and of sufficient length to completely encircle the bowel. The free ends were made to project a few lines beyond the mesenteric attachment, and were fixed by two fine catgut sutures, each of which embraced the corresponding angles of the graft and the mesentery. The stitches were made in the direction of the mesenteric vessels, so that in tying, no vessel should be included in the suture. In these experiments dogs were used exclusively.

Experiment 106.—Three pieces of omentum, two inches wide and sufficiently long to encircle the bowel, were completely detached and grafted as follows :

1. Graft simply laid over the bowel corresponding to the lower portion of the ileum and fastened in its place on mesenteric side by two fine catgut sutures.

2. Serous surface of bowel about 6 inches higher up scarified and graft applied to this surface and fixed in the same manner.

3. About six inches still higher up bowel treated in the same way, and one of the serous surfaces of the graft also freely scarified.

The graft was scarified on the side which was to be brought in contact with the bowel. Fixation of graft by two catgut sutures on mesenteric side. Animal killed 36 hours after operation. All the grafts adherent, slightly contracting the bowel at the three different places. On separating the adhesions the subjacent serous surface very vascular and denuded of its endothelial layer. Firmness of adhesions increases in proportion to the extent of scarification done, being least firm at No. 1, firmer at No. 2, and firmest at No. 3, where both coaptated serous surfaces had been scarified. At No. 2 and 3 the plastic lymph was freely supplied with new blood vessels. The vascularization was most conspicuous on the mesenteric side.

Experiment 107.—Two omental grafts planted around the ileum in the same manner as described above. At No. 1 both the bowel and the inner side of the graft were scarified; at No. 2, only the serous surface of the bowel. Animal killed 43 hours after operation. Stump of omentum adherent to abdominal wound and intestines. No peritonitis. At No. 1, graft firmly adherent over the entire extent. A slight extravasation of blood between the graft and the bowel. Beginning vascularization of interposed plastic lymph. At No. 2 also firm adhesions and beginning vascularization of the plastic exudation. Both of the grafts appear to be stained with the coloring material of the blood.

Experiment 108.—Planting of two omental grafts around the ileum about 8 inches apart. At No. 1 both the bowel and one side of the omental graft were scarified. At No. 2 only the serous surface of the bowel was treated in this manner. Animal killed six days after the operation. Both grafts firmly adherent throughout and freely supplied with blood vessels, the largest of the new vessels being on the mesenteric side. The omental stump adherent to the portion of bowel between the grafts where a flexion has been made from this cause.

Experiment 109.—In this experiment omental grafting was done at two points around the lower portion of the ileum. At one point the serous surfaces were left intact, at the other both the peritoneal surface of the bowel and the omental graft were freely scarified. Animal

remained perfectly well and was killed 8 days after operation. No signs of peritonitis. Both grafts formed a thin vascular layer around the entire circumference of the bowel and firmly and evenly united throughout. Vascularization was more marked where scarification had been done. On attempting to separate the grafts it was difficult to find and define the line of union between the omentum and the underlying bowel as the union was very intimate and firm.

REMARKS.—In all of these experiments the grafts retained their vitality, and in a few hours became firmly adherent to the intestinal surface with which they had been brought in contact. Scarification of the serous surface has also been found in these experiments an exceedingly valuable measure in hastening the process of adhesion, granulation and vascularization. By planting grafts side by side, with and without scarification, I was enabled to determine with accuracy the beneficial influence exerted by this procedure in favoring the reparative process, and without a single exception observed that where scarification was done the adhesions were firmer and vascularization more advanced. The post-mortem examinations appeared to demonstrate that the firmness of the adhesions and the degree of vascularization were in direct proportion to the extent of traumatic irritation of the peritoneum, being always most marked in cases where both the bowel and the under surface of the graft were scarified, and least where intact peritoneal surfaces were brought into apposition. As soon as the omental grafts were cut off from the omentum they were placed in a 1:2000 solution of corrosive sublimate, kept at the temperature of the body in order to secure for the graft a perfectly aseptic condition, until everything was in readiness for the transfer of the graft to its new location. Before planting the graft it was carefully dried by pressing it between gauze or sponges wrung out of the same solution. The scarifications of the serous surfaces should only be made sufficiently deep to give rise to a very slight oozing, as when hemorrhage is more profuse there is danger of the formation of a clot between the graft and the bowel, which, if it does not ultimately prevent union between the coaptated surfaces, must necessarily interfere with the formation of early and firm adhesions. Omental grafting cannot fail in becoming an established procedure in many abdominal

operations. After suturing a large wound of the stomach or intestines, a strip of omentum should be laid over the wound and fasted in its place by a few catgut sutures. After circular enterorrhaphy the operation should be finished by covering the circular wound by an omental graft about two inches wide, which should be fixed in its place by two catgut sutures passed through both ends of the graft and the mesentery. Omental grafting should also be resorted to in repairing peritoneal defects in visceral injuries of the abdominal organs, and in covering large stumps after ovariectomy or hysterectomy, where the pedicle is treated by the intra-abdominal method.

V. CONCLUSIONS.

In conclusion I beg leave to submit the following propositions for further discussion :

1. Traumatic stenosis from partial enterectomy and longitudinal suturing of the wound becomes a source of danger from obstruction or perforation in all cases where the lumen of the bowel is reduced more than one-half in size.
2. Longitudinal suturing of wounds on the mesenteric side of the intestine should never be practised, as such a procedure is invariably followed by gangrene and perforation by intercepting the vascular supply to the portion of bowel which corresponds to the mesenteric defect.
3. The immediate cause of gangrene in circular constriction of a loop of intestine is due to obstruction of the venous circulation, and takes place first in the majority of cases at a point most remote from the cause of the obstruction.
4. On the convex surface of the bowel a defect an inch in width, from injury or operation, can be closed by transverse suturing without causing obstruction by flexion. In such cases the stenosis is subsequently corrected by a compensating bulging, or dilatation of the mesenteric side of the bowel.
5. Closing a wound of such dimensions on the mesenteric side of the bowel by transverse suturing may give rise to intestinal obstruction by flexion, and to gangrene and perforation by seriously impairing the arterial supply to, and venous

return from, the portion of bowel corresponding with the mesenteric defect.

6. Flexion caused by inflammatory and other extrinsic causes gives rise to intestinal obstruction only in case the functional capacity of the flexed portion of the bowel has been impaired or suspended by the causes which have produced the flexion, or, by subsequent pathological conditions which have occurred independently of the flexion.

7. As in flexion, a volvulus gives rise to symptoms of obstruction when the causes which have given rise to a rotation upon its axis of a loop of bowel, have at the same time produced an impairment or suspension of peristalsis in the portion of bowel which constitutes the volvulus, or when a diminution or suspension of peristalsis follows in consequence of the degree or extent of the rotation.

8. Accumulation of intestinal contents above the seat of invagination is one of the most important factors which prevents spontaneous reduction, and which determines gangrene of the intussusceptum and perforation of the bowel.

9. Spontaneous disinvagination is not more frequent in ascending than descending invagination.

10. The immediate or direct cause of gangrene of the intussusceptum is obstruction to the return of venous blood by constriction at the neck of the intussusciens.

11. Ileo-cæcal invagination, when recent, can frequently be reduced by distention of the colon and rectum with water, but this method of reduction must be practised with the greatest caution and gentleness, as over-distention of the colon and rectum is productive of multiple longitudinal lacerations of the peritoneal coat, an accident which is followed by the gravest consequences.

12. The competency of the ileo-cæcal valve can only be overcome by over-distention of the cæcum, and is effected by a mechanical separation of the margins of the valve, consequently it is imprudent to attempt the treatment of intestinal obstruction beyond the ileo-cæcal region by injections per rectum.

13. Resection of more than six feet of the small intestine in dogs is uniformly fatal, the cause of death in such cases is

always attributable to the immediate effects of the trauma.

14. Resection of more than four feet of the small intestine in dogs is incompatible with normal digestion, absorption and nutrition, and often results in death from marasmus.

15. In cases of extensive intestinal resection the remaining portion of the intestinal tract undergoes compensatory hypertrophy which macroscopically is apparent by thickening of the intestinal coats and increased vascularization.

16. Physiological exclusion of an extensive portion of the intestinal tract does not impair digestion, absorption and nutrition as seriously as the removal of a similar portion by resection.

17. Fæcal accumulation does not take place in the excluded portion of the intestinal canal.

18. The excluded portion of the bowel undergoes progressive atrophy.

19. A modification of Jobert's invagination suture by lining the intussusceptum with a thin flexible rubber ring, and the substitution of catgut for silk sutures is preferable to circular enterorrhaphy by the Czerny-Lembert suture.

20. The line of suturing, or neck of intussusciens, should be covered by a flap or graft of omentum in all cases of circular resection, as this procedure furnishes an additional protection against perforation.

21. In circular enterorrhaphy the continuity of the peritoneal surface of the ends of the bowel to be united should be procured where the mesentery is detached by uniting the peritoneum with a fine catgut suture before the bowel is sutured, as this modification of the ordinary method furnishes a better security against perforation on the mesenteric side.

22. In cases of complete division of an intestine, if it is deemed advisable not to resort to circular enterorrhaphy, one or both ends of the bowel should be closed by invagination to the depth of an inch, and three stitches of the continued suture embracing only the peritoneal and muscular coats.

23. The formation of a fistulous communication between the bowel above and below the seat of the obstruction should take the place of resection and circular enterorrhaphy in all cases where it is impossible or impracticable to remove the

cause of obstruction, or, where after excision it would be impossible to restore the continuity of the intestinal canal by suturing, or where the pathological conditions which gave rise to the obstruction do not constitute an intrinsic source of danger,

24. The formation of an artificial anus in the treatment of intestinal obstruction should only be practised in cases where continuity of the intestinal canal cannot be restored by making an intestinal anastomosis.

25. Gastro-enterostomy, jejuno-ileostomy and ileo-ileostomy should always be made by lateral apposition with partially or completely decalcified perforated bone plates.

26. In making an intestinal anastomosis for obstruction in the cæcum, or colon, the communication above and below the seat of obstruction can be established by lateral apposition with perforated approximation plates, or by lateral implantation of the ileum into the colon or rectum.

27. An ileo-colostomy, or ileo-rectostomy by approximation with decalcified, perforated bone plates, or by lateral implantation should be done in all cases of irreducible ileo-cæcal invagination, where the local signs do not indicate the existence of gangrene or impending perforation.

28. In all cases of impending gangrene or perforation, the invaginated portion should be excised, both ends of the bowel permanently closed, and the continuity of the intestinal canal restored by making an ileo-colostomy or ileo-rectostomy.

29. The restoration of the continuity of the intestinal canal by perforated approximation plates, or by lateral implantation, should be resorted to in all cases where circular enterorrhaphy is impossible on account of the difference in size of the lumina of the two ends of the bowel.

30. In cases of multiple gunshot wounds of the intestines involving the lateral or convex side of the bowel, the formation of intestinal anastomosis by perforated decalcified bone plates should be preferred to suturing, as this procedure is equally, if not more, safe, and requires less time.

31. Definitive healing of the intestinal wound is only initiated after the formation of a network of new vessels in the product of tissue proliferation from the approximated serous surfaces.

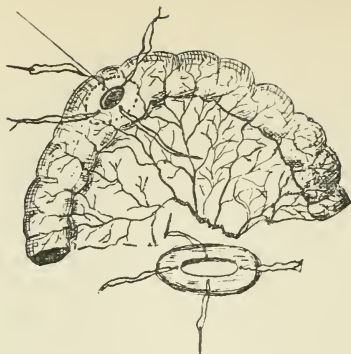
32. Under favorable circumstances quite firm adhesions are found within the peritoneal surfaces in six to twelve hours which effectually resist the pressure from within outward.

33. Scarification of the peritoneum at the seat of coaptation hastens the formation of adhesions and the definitive healing of the intestinal wound.

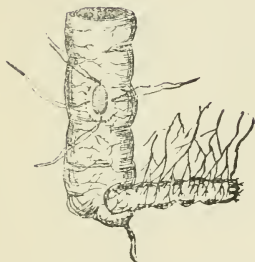
34. Omental grafts, from one to two inches in width, and sufficiently long to completely encircle the bowel, retain their vitality, become firmly adherent in from 12 to 18 hours, and are freely supplied with blood vessels in from 18 to 48 hours.

35. Omental transplantation, or omental grafting, should be done in every circular resection, or suturing of large wounds of the stomach or intestines, as this procedure favors healing of the visceral wound, and affords an additional protection against perforation.

Plate within the intestine above seat of obstruction.



Perforated decalcified bone plate.

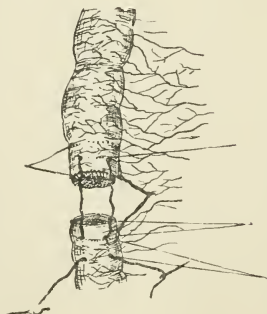


INTESTINAL ANASTOMOSIS BY PERFORATED DECALCIFIED BONE-PLATES.

Plate within colon below seat of obstruction.

Approximation of intestine by tying of sutures.

Rubber ring within bowel fixed by continuous catgut sutures.



Needles passed from within outward through entire wall of bowel and ring

Part to be invaginated.

Needles passed through serous and muscular coats.

AUTHOR'S MODIFICATION OF JOBERT'S SUTURE.

PLATE. I—METHODS OF INTESTINAL ANASTOMOSIS.

THE ULTIMATE RESULTS IN A CASE OF EX-
SECTION OF THE HEAD AND UPPER THIRD
OF THE HUMERUS.

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AT the battle of Williamsburg, May 5, 1862, the patient, Watkins, was wounded by a rifle ball, sustaining a compound comminuted fracture of the upper third of the humerus. Ten days after the infliction of the injury he was operated upon at the Mill Creek Hospital, by Dr. Leroy McLean, then surgeon of the Second New York Volunteers, now of Troy, N. Y. The following information concerning the case, for which we are indebted to the Surgeon General, U. S. Army, is contained in the records of his office.

Head and continuity of humerus to the extent of five inches were excised by linear incision six and one-half inches between deltoid and biceps. Some atrophy. Apparatus, applied two years and nine months afterwards, was very successful in sustaining rigidity of arm.

For some years subsequently at infrequent intervals the track of the wound suppurated and discharged small pieces of necrosed bone—a condition of affairs doubtless favored by the patient's intemperate habits and irregular life. He was admitted to the Eastern Michigan Asylum April, 1887, suffering from mental enfeeblement consequent upon repeated attacks of hemiplegia affecting the left side.

The present state of the arm, and the free use which he has

of it are highly complimentary to the success of the operation. Considering the extent of the bone excised, the wide latitude of voluntary motion preserved to the arm is quite remarkable. Without the assistance of any apparatus to give the arm support, he can feed himself, button his clothing, and perform many acts which require complexity of movement. He

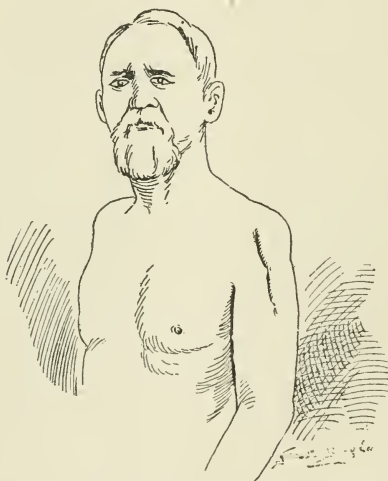


FIG. I. APPEARANCE OF ARM TWENTY-FIVE YEARS AFTER EXSECTION OF HEAD AND UPPER THIRD OF HUMERUS.

is able also to make strong traction with arm extended—sufficient at least to carry a pail of water suspended from the hand. The hand-grasp is strong, and the arm below the line of incision does not differ perceptibly from its fellow in size.

The motions of the arm seem to be limited to two—a vertical motion towards the scapula, and a slight backward motion. The patient can not bring the humerus forward upon the chest. It is probable that only the lower portion of the humeral at-

tachment of the pectoralis major remains; and as this portion is made up of the fibres coming from the sternal half of the clavicle, it follows that any action of the fibres of the muscle which remain attached to the bone will be to raise the arm vertically toward the scapula, at the same time drawing it closer to the subject's side. Consequently the pectoralis

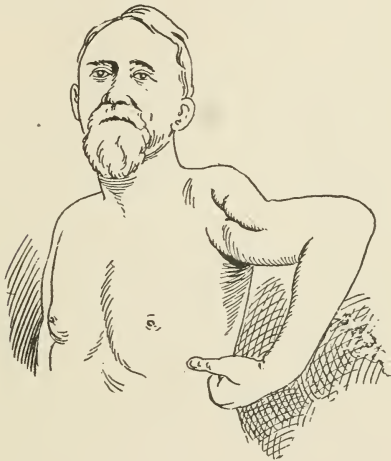


FIG. 2 AMOUNT OF ELEVATION TWENTY-FIVE YEARS AFTER OPERATION.

major is limited in its action in this case to assisting the deltoid and coraco-brachialis.

There is marked atrophy of the deltoid, but inasmuch as its insertion is preserved entire, the muscle is able by contracting to raise the humerus towards the scapula. It cannot however act so as to extend the arm at right angles to the body, owing to the lack of any fixed point. In other words, the fulcrum to the lever is wanting.

The subscapularis, infraspinatus and teres minor—muscles concerned principally in performing rotation of the arm—hav-

ing lost their insertion, have become greatly atrophied from disuse.

The slight backward motion which the patient is able to give to the upper portion of the arm is probably derived from the action of the *teres major*, some fibres of which are probably still inserted into the humerus. It does not seem likely that the *latissimus dorsi*, the principal agent for this motion in the normal arm, is able to effect any here, as its point of insertion is higher than that of the *teres major*, and in this case it seems lacking.

The *coraco-brachialis*, which would ordinarily assist the deltoid in raising the humerus toward the scapula, probably plays very little part here. It, together with the short head of the biceps, lies near the track of the wound and seems to be much atrophied. By means of the deltoid and the remaining fibres of the *pectoralis major* the patient is able to bring the humerus close up against his body, and by thus establishing a fixed point for it, assists in performing the various motions of the fore-arm and hand which are concerned in feeding himself, fastening his clothing, and similar acts.

EDITORIAL ARTICLES.

THE RELATION OF IMPERFECT OR IMPROPER TREATMENT TO THE PRODUCTION OF NON-UNION AFTER FRACTURES OF THE LONG BONES.

Celsus (*De Medicina*, libr. viii., cap. x.) incidentally alludes to non-union of broken bones, thus : "When the bones happen not to unite, *because they have been often opened and often moved*, the method of cure is obvious." This teaching of the ancient author is repeated by the modern Malgaigne in his dictum that when union fails to occur, the treatment is most frequently to blame for it ; and both express the generally received opinion, lay as well as professional, that failure of union on the part of a fractured bone is *prima facie* evidence of neglect or imperfect treatment. P. Bruns, in his more recent treatise on fractures in the volumes of the *Deutsche Chirurgie* (Lief. 27, haëlfte ii.), after the statement that delayed or non-union occurs in some cases of fracture notwithstanding the apparently unexceptionable conduct of the patient and correct treatment by skillful surgeons, adds that, "nevertheless, the *sole* cause of non-union is certainly often enough improper or imperfect treatment." The natural result of this doctrine is to expose every surgeon, in whose care a fractured bone has been in which union is delayed, or fails altogether, to the charge of malpractice and to a loss of confidence in his professional skill, if not to a suit at law.

I propose in the following pages to inquire to what extent general experience corroborates the above given opinions ; or, in other words, to inquire whether the occurrence of non-union after fracture is presumably an evidence of imperfect or improper treatment.

It is doubtless true that in the history of very many cases of ununited fracture, defective immobilization can be proven to have been

present. On the other hand it is equally true that in an immense number of instances gross defects of immobilization are common without interfering with the steady consolidation of the fracture. Such are fractures of the ribs and of the clavicle in general, and a large proportion of fractures of the humerus and of the femur. Gunshot fractures of the shaft of the humerus in a marked degree present obstacles to securing adequate immobilization in their treatment, especially in the field in time of war, and yet, out of 2900 cases of shot fracture of the shaft of the humerus treated expectantly, as recorded in the Medical and Surgical History of the War of the Rebellion, in six only did non-union result. The only case of delayed union after fracture of the clavicle which I have yet met with was in the case of an apparently robust young man, in whom unusual care to immobilize the fracture had been taken by the surgeon under whose treatment he had been, by the application of a plaster bandage. Nevertheless, at the end of four weeks, when I first saw him, no callus had been thrown out, and the fragments were as movable as if the fracture had just been sustained. Under my advice all dressings were discarded, and the patient bidden go to work. At the end of two weeks he returned with an abundant ossifying callus uniting the fragments.

The frequency with which false joints have developed in fractures occurring among sailors on shipboard, who, in some cases, are many weeks without receiving skilled attention, has been noted (Norris, Curling, Harrison, Bruns), and these cases have been considered as illustrative of the effects of lack of immobilization, particularly as in many instances consolidation took place under proper hospital care after reaching port. No consideration of these cases can be complete, however, without taking into account also the defective hygiene of such sailors both before and after injury, the character of their diet, their crowded and imperfectly ventilated sleeping accommodations, and their long confinement on shipboard, all of which tend to create constitutional conditions not conducive to repair of injuries of any kind.

The frequent failure of passive and active movements to prevent ankylosis at the elbow, for instance, after excision of the joint surfaces, the invariable repair of fractures of the lower extremity of the radius in

which that fracture receives no treatment at all, the healing of fractures of the ribs and of the clavicle, these all are, doubtless, due to the extent and activity of the nutritive processes in the cancellated tissue involved in the injuries named. The dense compact tissue of the shaft of the humerus or the femur presents conditions less favorable for nutritive activity than the parts just mentioned. It is to be expected, therefore, that whatever causes, local or general, may be present in an individual case, tending to lessen reparative energy, would be more likely to determine absolute failure of repair in these bones than in others. The relative proportion of such failures may be calculated from the statistics of Bruns (op. citat., § 4 and 413), which includes 19,455 fractures of the arm and forearm, thigh and leg. From the figures given by this author I find that, if the relative frequency of non-union after fractures of the bones of the forearm be taken as the unit of comparison, non union in fractures of the bones of the leg is three times as frequent, and of the femur and humerus each six times as frequent, the proportion of cases of non-union to the entire number of cases of fracture of the particular bone being nearly the same in each of these two last named bones.

Granted, therefore, that fractures of the shaft of the femur and of the humerus are more frequently followed by non-union than those of other bones, and that the construction of the tissue of these bones is such as to render them more powerfully affected by any causes that tend to hinder repair, the question recurs, ought defects of immobilization to be considered as the *sole* cause of arrest of repair in any considerable proportion of cases? From the sphere of this question I would exclude cases of exaggerated neglect and intentional free movements of fragments. The question of defective immobilization in most of these cases has simply to do with the thoroughness of attempts at reposition of the displaced fragments and their retention by sufficiently efficient apparatus, of extension and counter-extension, the use of this or that kind of retentive apparatus, the inclusion or non-inclusion of neighboring joints in the immobilizing appliances, and such like matters. Certainly in the great majority of cases the results of such imperfect treatment are limited to the production of excessive callus, to

deformity and shortening of the bones. That in some cases where immobilization has been incomplete, non-union has resulted does not necessarily imply that this result was due to the defective immobilization. Very pertinent to this point is the testimony of Girdner (*ANNALS OF SURGERY*, 1887, vol. vi., p. 30) that in the treatment of fractures in insane patients, whose restlessness made it difficult to properly adjust and immobilize the fragments, he was always able to obtain bony union, except in cases of general paresis, in which class of patients, although they were, as a class, more manageable than patients with most other forms of insanity, osseous union was the exception, and greatly delayed union, soft fibrous union, or more frequently, complete non-union was the rule.

May it not be that in a much larger proportion of cases than has hitherto been acknowledged a more severe inquiry would elicit other causes, either local or constitutional, to which the non-union could be properly referable, rather than to the defective immobilization. The observations of Macewen as to the agency of a leaflet of the torn fibrous capsule of the patella, by becoming interposed between the fragments in cases of fracture, in producing the failure of bony union which is common after fractures of that bone, are suggestive that similar strips of periosteum may become torn up and interposed between fragments, and interfere with union in fractures of other bones more frequently than has hitherto been recognized. In a case of compound comminuted fracture of the humerus recently under my care, I found large fragments entirely stripped of their periosteum, and it is easy to conceive of the stripping up of portions of periosteum to a less extent in less severe injuries, and yet sufficiently extensive so that, by their entanglement between the fragments, union may be delayed or entirely prevented.

As to constitutional causes, Otis quotes Neudörfer as explaining the rarity of non-union after gunshot fractures of the humerus by the statement, "Pseudarthrosis, as a rule, is an evidence of a constitutional disease of the blood, which, among soldiers generally, and especially at the years in which they take the field, is rarely to be found." Bruns, again, in speaking of the etiology in general of non-union of fractures,

declares "that the cause of pseudo-arthrosis remains entirely undiscoverable in very many cases;" and Packard (*Internat. Encyclop. Surg.*, iv., 43) states that non-union "may occur under the best treatment, and in persons seemingly of good health."

If then constitutional conditions indisputably determine non-union in many cases, and in the vast majority of instances defective immobilization fails to prevent union, it is more reasonable to refer failure of union when it does occur, even in those cases in which the immobilization has been defective, to the coincidence of constitutional causes, however difficult of demonstration, rather than to the defective treatment. It is easy to conceive, also, of cases in which the reparative energy of the tissues is weak, but in which, nevertheless, repair would ultimately take place under favorable conditions. In such cases defects of immobilization in the early history of the case might be sufficient to overwhelm the feeble local reparative power, and determine ultimate absolute non-union. But even in these cases the treatment is only one of the causes that have produced the result.

Constitutional conditions, if they exist, tending to retard the union of fractured bones, should declare themselves in more than one bone in the same individual if multiple fractures coexist, or if different bones were fractured at different times, unless, indeed, it be claimed that the constitutional state was a temporary one, as is undoubtedly the case in some instances, as from pregnancy, scurvy and certain acute diseases. I can cite from my personal observation two cases bearing upon this point. The first was in the person of an apparently healthy young man, 25 years of age, who sustained a fracture of the right femur, through the upper part of the middle third, from a fall from a wagon upon frozen ground. Some years before he had fractured the other femur; after due treatment for the usual length of time for that former fracture, he had resumed use of the limb, which was apparently healed, but a gradual bending of the femur at the site of the injury followed, until a **N**-like bend had been produced, which caused an unsightly and prominent projection upon the front of the thigh, and shortened the limb more than three inches. In this position full consolidation finally took place. The new fracture which

came under my care likewise apparently did well under ordinary treatment, and by the ninth week he began to walk upon it. Three weeks later the firmness of the union was still apparently satisfactory, but a slight outward curvature at the upper part of the thigh was noticeable. The shortness of the opposite limb caused a manifest strain to fall upon the newly united femur at this point in walking, and accounted for the bowing which had taken place. Though crutches were advised, the bend continued to become more marked. I lost sight of him for a time, but at the end of seven months, he returned to me, the outward bend at the site of the fracture being very marked. I now had constructed for him a modification of a common hip-joint extension brace, whereby the limb was kept extended, the weight of the body in walking was supported by a perineal crutch, and a broad band of elastic webbing was made to exert constant inward traction at the point of bending. Rapid straightening of the limb was effected by this device, with the result of lengthening it two inches. At the end of a month the femur had regained its natural direction. He was dismissed with the injunction to continue the brace for a time. His after history I do not know. The point of interest about this case in this connection is the existence of a constitutional condition in an apparently healthy young man which at two different periods, some years apart, occasioned delay in firm ossification of a fractured femur.

The second case was in the person of a robust mechanic who at one time sustained a fracture of his left leg. Under the usual treatment of support and immobilization union was still delayed at the end of 16 weeks. He was then encouraged to use the limb, with the support of proper splints, and, gradually, as he continued to walk upon it, consolidation took place, though with considerable deformity. Twelve years later, at the age of fifty, he fractured his left humerus at the junction of the lower and middle thirds. Though under skilled treatment from the first no union took place, and a typical pseudarthrosis developed, as was demonstrated in the course of an operation for its relief by myself three and a half months later. The oblique ends of the two fragments, though held in close apposition to each other by a capsule-like envelope of dense fibrous tissue, were each covered with a

thick well formed fibrous layer. My operation at that time consisted in the removal with a saw of a thin slice from each end, and then wiring the two refreshed bony surfaces together. Again no union took place. At the end of five months more, the general health of the patient being good, the site of fracture was again exposed, the loosened wires removed, the ends of the bones, which were bare and devoid of any appearance of reparative power, were thoroughly scraped, as was also the whole cavity among the soft parts in which they lay. The wound was not closed, but simply stuffed with a sterilized sponge dusted with iodoform, the whole covered with some absorbent material; a side splint completing the dressing. This second operation was more beneficial than the first. Abundant callus was thrown out about the ends of the fragments, and especially in the territory occupied by the sponge. The consolidation rapidly became so firm that the man was able to resume his work; but, nevertheless, full ossification was retarded, for at the end of three months slight lateral bending could still be impressed upon the bone at the seat of fracture.

In conclusion, I wish to say that, from the considerations which I have attempted to present in the preceding paragraphs, I am led to the conclusion that there is room to question the soundness of the teaching that imperfect immobilization is *often* the sole cause of non-union, or even the chief cause thereof. It seems to me rather that the weight of evidence is such as to justify the assignment to constitutional states, and to local conditions not within the control of the surgeon, a yet larger role in the etiology of pseudarthroses than is generally recognized.

LEWIS S. PILCHER.

A MODEL OPERATING THEATRE AND ITS FITTINGS.

There must be many readers of this journal who would value greatly the opportunity of traveling over the continent of Europe and studying carefully the construction and arrangements of the operating theatres which have, in recent years been constructed with a special view to the practice of the most rigorous antiseptic surgery. For various and different reasons most of us are unable to make this instructive

and pleasant journey. But we can obtain some of its advantages by studying the description of the new operating theatre which has been built and fitted up under the direction of M. Maunoury, of Chartres, on his return from a visit, made with M. Kirmisson, to such well-known theatres as those in which operate Tripier of Lyons, Julliard and Reverdin of Geneva, Kocher of Berne, Socin of Bâle, Krönlein of Zurich, and Czerny of Heidelberg.

Lighting, cleaning, general arrangements, furniture, attendance, all differ in these new theatres from what is to be seen in older ones; because all are planned with a view to an end of which formerly no one had any idea, namely that of strict antisepsis. The ideal is to construct a theatre in which the attainment of this end shall be so facilitated that the surgeon may go about his operations with a mind free from anxiety, though not from responsibility on the point. It is satisfactory to think that it is not the most costly arrangements which bring us nearest to this ideal. M. Maunoury went from town to town with a fastidious eye, taking no individual as the only correct model, but culling an idea here and another there, and finally coming home to put the best of these notions into practical form. He was careful to learn from the evil as well as from the good he saw.

His new theatre was begun in September, 1886, and finished in May, 1887. Since June 6, he has been operating in it. Experience has brought to light various defects which he is careful to point out in his paper.

Chartres being a small hospital without a school, no rows of seats are required for spectators, but that does not materially affect the arrangement of the operating space proper. There is this to be borne in mind, however, that, while at some large institutions, e. g., that of Heidelberg, three separate theatres are provided, one for laparotomies, one for ordinary operations, and a third for septic cases, Chartres has to be content with one operating room only. This increases, if anything, the necessity for perfecting its details with a view to antisepsis.

The new theatre is about fifty yards from the main building of the hospital, a separation which has certain inconveniences. The only serious one is that the patients just operated on have to be carried back

across the garden to the wards. For this purpose a warmed and covered stretcher or litter is used. On the other hand are to be placed the purity of air, the better lighting, the absence of nurses and servants, and the distance from such infectious cases as may be in the hospital.

But, for grave cases which specially require repose and warmth after operation there is a special room opening, not out of the operating theatre itself, but out of its ante-room or vestibule.

This vestibule is a small room with three doors, one opening into the garden, the second into the theatre and the third into the small room or ward already mentioned. The room door of the operating room is of iron. In the vestibule are kept the surgeons' aprons, the blankets, sheets, napkins, towels, etc.; an enamelled bucket for soiled linen, and also the furnace of the heating apparatus. By this arrangement the necessity is avoided for anyone to enter the theatre itself in the absence of the surgeon and his assistants, except the single reliable person who is entrusted with the cleansing of the theatre.

The theatre itself is a large apartment, nearly square, in which have been avoided all corners and grooves. Its angles are rounded and the window frames are even with the inner surface of the walls. None of the tables, pipes or other fittings approach to the wall nearer than an inch. The dimensions of the room are 4m 45 wide, 5m 45 long, and 3m 65 high. The wall on the side of entrance is the most elaborate. Upon this wall are the door of entry, the warming apparatus, a linen warmer and a water heater warmed with gas, a wash basin with hot- and cold-water taps, a Chamberland's filter with its receiver and lastly gas-fittings.

The opposite wall has a large window 2m 45 wide, by 2m 35 high and an injecteur on each side. In each of the side walls is also a window 1m 95 wide by 2m 35 high, besides numerous small tables. In the ceiling there is a sky-light 2m 90 wide by 2m 25 long.

All the materials used in this room can be washed freely with water. It contains no wood. Everything is iron, glass or Portland cement. The window frames are of iron and the ceiling as well as the walls are of bricks dressed with Portland. The whole is painted in oils with zinc white.

With regard to the question of dressing the walls the choice seems to be between plaster, stucco and an hydraulic cement. Plaster cannot resist damp. Stucco, though otherwise excellent, is dear and apt also to crack. For these reasons, M. Maunoury chose cement and hydraulic lime. Socin of Bâle has covered the walls of his theatre with a layer of hydraulic lime which can be painted over every year.

Although Maunoury asked to have a similar dressing applied to his walls, in some way or other they got covered with Portland cement. In about two months the paint began to come off in scales while yellowish drops transuded here and there. A new painting resulted no better.

Portland has also been employed for the floor and here it has given entire satisfaction. The greater part of the theatres which M. Maunoury has visited are paved either with Mosaic or with "Terrazzo," *i. e.*, a mixture of cement and crushed marble. Mosaic easily cracks; Portland makes the best floor of the three, provided only that it be laid on a sufficiently thick and strong bed of "Beton" which is a kind of mortar.

The side windows extend from about 0 m 80 or 0 m 90 above the floor up to 0 m 50 from the ceiling. Experience has shown that it would have been better to have carried them right up to where the wall begins to arch off into the ceiling. The windows are divided perpendicularly into four, of which the two middle open outward. This prevents the blinds which are external from being lowered without going outside to do it. This disadvantage is, however, less than what would have resulted from the use of internal blinds or from making the windows open inward.

The roof of the building is high pitched and the window in it being narrower than that in the ceiling below, some of the light which should come through the latter is intercepted. A flat roof would have been preferable. Maunoury thinks that a double sky-light, or in other words a window in the ceiling and another in the roof essential for the following reasons: First, there would otherwise be an angular space difficult to clean; secondly, much heat would probably be lost; lastly, condensation of moisture on the glass would have been unavoidable and

the water would have trickled down the walls or dropped into the room. The space between the two windows is always closed except a narrow chink beneath the border of the roof window, through which condensed steam can escape. Small as these fissures are, dust gets in and necessitates the occasional cleaning of the ceiling window. Without the roof window this dust would enter at all times and fall into the theatre itself, although the situation is a tranquil garden, large in size and almost in the country. What then would happen in a large town?

At first moisture used to collect on the ceiling window and drop into the room; but this was entirely prevented by placing in one of the panes a piece of perforated glass about eight inches by sixteen.

When the doors and windows are closed the only air which enters comes through the "calorifere" and the temperature can be rapidly raised to 20 or 25 degrees centigrade.

The water pipes are not buried in the masonry lest any leakage should occur, and they are kept at a slight distance from the wall so that they can easily be dusted or washed all around. A tap controls the main pipe as soon as it enters the building, and near it is a mouth piece covered by a cap which unscrews to permit the attachment of a long rubber tube, through which the whole theatre and its contents can be douched. The Chamberland's filter is "*à sept bougies*." The water flows from it into a glass barrel which holds 50 litres. The upper opening of the glass barrel is closed with wadding pierced by the caoutchouc tube from the filter. The sponges, instruments and wounds are washed with this water only.

During the winter the filtered water remains perfectly clear, but during the hot weather, from July to September, a thin layer of green algæ develops. Chamberland's filter acts perfectly, and stops all germs, but the glass barrel is so large that it cannot be kept permanently sterile. It is as well not to exaggerate difficulties and dangers, and perhaps the water contains no pathogenic organisms, but M. Maunoury now boils all the filtered water he uses over a gas stove. The boiler heated by gas supplies hot water to the lavatory, it also encloses a small linen closet, and by means of a tap with tube attached serves to fill the reservoir of the operating table to be described pres-

ently. The wash basin is let into a marble table upon which lie glass receptacles for soap, brushes, etc. The basin itself consists of an iron receiver and a movable basin inside it.

The escape of the waste water which falls on the floor from the operating table or when the room is cleansed presents a difficult problem. Almost everywhere, even in the best theatres, the arrangement is a small grating in the floor leading by a covered drain to the street or even into the sewer. Whenever Maunoury has had the curiosity to raise this grating, he has found beneath it a collection of impurities in a narrow place difficult to clean. Moreover the syphon trap in the canal is not to be trusted. Besides, is not the water in the syphon itself a culture medium for germs? For the germs of the sewer outside which may thus infect the conduit and penetrate into the operating theatre itself. Following the advice of M. Tripier, Maunoury has made an open drain finishing at the wall with a copper tap, which when closed prevents a draught inward. Outside the room the drain is continued still open to the air as far as a trapped sink two yards off. Where the immediate exterior of the building is not private this exposure of bloody fluids would be objectionable. However the external drain could easily be kept clean anywhere. It has also been objected that in severe winters the drain would be frozen up. But it must be recollected that a great deal of the escaping water is warm. Also in winter it would be easy to place a temporary covering.

It is contemplated to attach a hot air chamber for sterilizing instruments and dressings to the gas stove. For artificial lighting a Cro-martie's lamp is used, which does excellently for ordinary operations, but which would not do at all for a resection of intestine. Hence the electric light suitably arranged would be preferable.

Along the walls are placed a certain number of glass tables for the dressing and instrument cases, etc., in immediate use. They are 11 millim. thick and 30 or 40 centimetres wide. They rest on copper brackets which keep them 3 centimetres from the wall. Their collective length is more than 16 metres. The two irrigators or receptacles for the fluids used for douching wounds, consist each of a glass barrel containing 10 litres, fitted with rubber tube nearly 4 metres long.

They are charged, one with carbolic solution, the other with sublimate. They are stoppered with plugs of wadding and covered on the top with a loose cap of tin to keep the plug dry when the walls are douched.

The sponges are in four short necked bottles numbered 1, 2, 3, and 4 which are employed one after the other according to the practice of Professor Socin. When the sponges from No. 1 have been used they are washed and replaced in their bottle. No. 2 sponges have the next turn and so on until it comes round to No. 1 again. They are kept in carbolic solution.

There is nothing special to say about the bottles containing the various antiseptics in use, the boxes of dressings, the dishes, trays, etc. They lie on the glass tables.

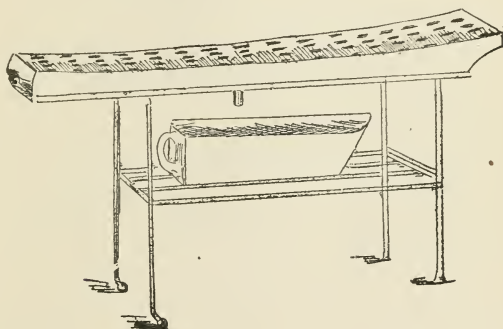


FIG. 1. OPERATING TABLE

The operation table, see Fig. 1, is easy to clean and cannot be impregnated with liquids. It is the table of Julliard as modified by Socin. The patient lies upon a sheet of zinc, sufficiently strong, and pierced with large holes to permit the escape of the douching water which in common tables soaks the patient from head to foot. This perforated sheet is placed 5 or 6 centimetres above a reservoir of the same area and capable of holding about 48 liters. When in use it is filled with warm water. Julliard placed this upon a wooden table.

Socin substituted iron, and put castors upon the legs. Mannoury thought the mobility too great, and had castors placed only on the fore legs. When the hind legs are lifted the whole table is easily wheeled. A receptacle beneath catches the water which flows through the table.

A second table, consisting of two frames of iron, placed one above the other and each supporting a glass tray, carries everything which the surgeon wishes to have at hand during the operation, such as instruments, sponges, catgut, lotions, etc.

From the clinique of M. Reverdin, of Geneva, M. Maunoury brought a very useful contrivance, shown in Fig. 2. It consists of two parts, a stool and a sheet of india rubber disposed in a special manner.

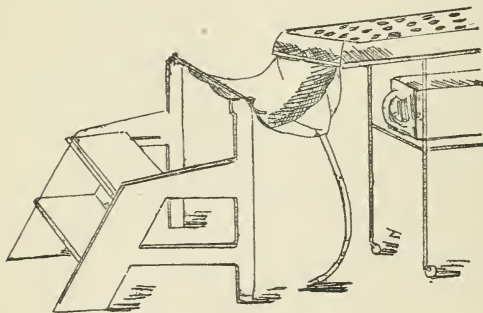


FIG. 2. REVERDIN'S STOOL.

"Reverdin's stool" is a kind of small steps, of which the higher one is divided lengthwise in such a way that it can be either turned up or turned down to make a seat for the surgeon. The two front legs are carried upwards nearly as high as the top of the operating table, and across them is placed an iron bar, the extremities of which, a little raised and elbowed, are intended to sustain the feet of the patient, whilst the central part permits the surgeon to rest his fore-arms upon it, which gives a great precision to the movements of the hand.

M. Maunoury, having recently to do an operation for vesico-vaginal fistula which occupied more than an hour, did not at the end feel the least fatigue. The india rubber sheet forms a kind of funnel ending

in a rubber tube which reaches to the ground. Besides being a protection to the surgeon it can be to a certain extent used by him as a table on which he can put down his speculum, etc., occasionally.

M. Maunoury finds the apron of india rubber with which the German surgeons cover themselves from head to foot, productive of great heat during a long operation and of a decided feeling of malaise at the end of it.

It was said at the commencement that at Chartres there is no school. But it would be easy to adapt such an operating room as has just been described to the requirements of a theatre for students. The wall of the room opposite the door of entrance would have to be removed and, instead would be built out room for rows of steps. It should be paved with Portland, like the floor of the room. The floor itself should be rigorously forbidden to persons coming from the rows of steps and the latter should be only accessible through a special door at the back. The steps and desks might themselves be of wood, but should stand on iron supports. Attempts to make satisfactory ones of iron or of iron combined with glass have not hitherto been very satisfactory.

The care of such an operating room and its proper cleansing require a person of intelligence and with a strong sense of duty, who will understand the importance of the rules he will have to strictly adhere to.

When an operation room is to be constructed on new principles, it is a point of the first importance that every detail of its construction should be carried out under the eye of the surgeon who is to use it. Otherwise the result will be a number of shams and some tremendous errors. Of course he will not actually direct the works himself. The architect has special problems to solve just as the surgeon has, and the latter has no competence to judge of the value of materials or to direct the workmen. What is necessary is a strict collaboration between the surgeon and the architect. Both considering before all things the end to be attained and holding quite secondary the means of attaining it. That is to say the surgeon, who alone understands fully this end should follow the architect step by step, and see that nothing is

done which compromises the matter. Many details which to us are of the highest importance, may be regarded by the architect as trivial. If the surgeon is not on the spot, it may be afterwards next to impossible to correct the error. "That is to say" adds M. Maunoury, "if similar theatres to that which I have described are to be constructed in our great hospitals it is necessary, unless one desires a sterile labor, to avoid at all costs the submission of the project to those all-powerful commissions which are in a fair way to ruin us and render us ridiculous by covering Paris with monuments of which the facades cost millions but of which the interior is arranged without the least understanding of the ends to be attained." The "Hospitals Commission of Chartres," set the liberal and intelligent example of giving to M. Maunoury, its surgeon in chief, a free hand. He received at once the authority to direct the work and the responsibility for its proper construction. After receiving a preliminary estimate, it voted the sum necessary and left M. Maunoury to construct the theatre at his own risks and perils. The expenses were moderate. A detailed account is given in *Le Progrès Médical* for February, 1888, from which the whole of the information in this article is taken.

The total cost of building and furnishing amounted to 9,899 francs, *i. e.*, about £400. This includes 1,375 francs for furniture, the operating table cost 243 francs, the Chamberland's filter 77 francs, the iron instrument table with glass trays 67 francs, the Reverdin's stool 25 francs.

C. B. KEETLEY.

INDEX OF SURGICAL PROGRESS.

HEAD AND NECK.

I. Suppurative Periostitis of the Walls of the Orbit Consecutive to Suppuration in the Frontal Sinuses. By M. PANAS. (Paris). The author discusses a case of this description which had recently come under his notice. A man, age not given, was admitted with suppurative periostitis of the walls of the orbit; the abscess had pointed at the upper part, and had been previously opened, giving exit to pus, which had left a fistulous track. The history was negative in regard to syphilis and tuberculosis, but two facts were plainly elucidated upon further examination. First there was extreme fœtor coming from the nasal passages; secondly the nasal mucous membrane was swelled and ulcerated. In addition to which there was considerable tumefaction of the tissue above and below the eyebrow, in the situation of the frontal sinuses. [No note as to which side]. The patient had suffered from chronic coryza with ulceration of the nasal membrane presumably for some time, but no note is given of its duration—following suppuration in the frontal sinus and periostitis of the orbit. Chloroform having been administered, a director was passed along the fistulous track, upwards and inwards, and reached bare bone which was soft and carious. A little pressure upon the instrument forced it into the cavity of the frontal sinus. An incision was then made along the director, and pus in abundance at once began to escape from the sinus. The opening in the bone was enlarged, and a drainage tube inserted. Antiseptic dressings were applied, and for the next few days the sinus was washed out with boric lotion, and the nares similarly treated with hot water. The fœtor from the nose was kept in check with iodoform. In seven days since the orbital swelling had almost entirely disappeared. The author refers to the fact

that although in the generality of the cases suppurative periostitis of the orbit does not present diagnostic difficulties, this is not always the case. In a patient of Velpeau's, a child, who had received a kick from a horse over the orbit, the opinion was formed that the swelling which subsequently developed was due to a sarcomous growth. Again, General Radetsky suffered for some time from a similar swelling, which in all respects, according to distinguished surgeons, both in Vienna and Milan, resembled a new formation of a malignant nature, upon this belief the general was advised to submit to enucleation of the eye. But he refused, and the swelling, in his case, as in the one above mentioned, proved inflammatory.—*Le Progres Médical*. Dec. 1887.

H. PERCY DUNN., (London).

II. The Correction of Nasal Deformity by Means of Plastic Operation. By PROF. DR. OBLINSKI. (Krakau). This paper refers more particularly to deformities resulting from loss of the cartilaginous framework of the nose. Dieffenbach treats this class of patients superficially, recommending the division of the cicatrices, which deviated the point of the nose, by means of a tenotome, and the filling of the nares with lint. This method gives only temporary relief.

In a girl, æt. 16, Prof. Oblinski found the following deformity: The tip of the nose, as a result of the destruction of the cartilaginous septum, was sunken in: on each ala nasi there was a deep longitudinal groove, formed by cicatricial tissue, dividing the lower half of the nose into three spheroidal growths, which eventually would completely obstruct the nares. At the upper end of the right sulcus there was seen an opening through which the air entered into the nostril. The author after completely cutting out the right groove with its cicatricial tissue, and also incising the opening in its upper extremity, replaced the gap, thus left by an oblong flap from the cheek, cut from the upper end of the right sulcus. The flap was 2 cm. long and 1 cm. broad and easily filled the gap. Primary union occurred. The left sulcus was also excised in the same manner, and replaced by the oblong cheek flap. The cosmetic result was satisfactory. The tip of the nose was well raised. The author recommends, however, a larger flap in the fu-

ture, thus allowing for subsequent contraction.—*Deutsch Zeitschr. f. Chir.* band 24, heft 1-2.

III. Tuberculosis of the Mouth. By P. SCHLIFEROWITSCH (Heidelberg). The author has collected all the cases in literature where the diagnosis of tuberculous disease of the buccal cavity could be fixed with some certainty. They number 88, and include those of primary and secondary tuberculosis. The most constant symptom in these cases is salivation. Males are most frequently the subjects of this disease. It is exceptional in the very young, and is most commonly found between the ages of 40 and 50 years. The appearance of the tuberculous ulcer is characteristic. If on the tongue, it is found on the borders, (left side mostly), near the tip of the organ. It is an oblong ulcer, raised, ragged borders of hard consistence, showing the color of fresh granulation. The floor appears as if covered by a pseudo-membrane, if this covering be removed the surface left easily bleeds. The floor of the ulcer is uneven, as if covered with papillæ. There is no great discharge of pus from such ulcers, and in many cases miliary abscesses may be found around the ulcer. Pain is never so prominent as in carcinoma. The neighboring lymph glands are rarely swollen. In the primary form of the disease the presence of tubercle bacilli are, the surest criterion in fixing the diagnosis.

After eliminating syphilis by specific treatment, the diagnosis remains between tuberculosis and carcinoma. As to duration, time of development and age, there seem to be few reliable data for diagnostic purposes.

A microscopic examination of a piece of the growth will be necessary in some cases. The prognosis is better in the primary purely local form of the disease than in the secondary variety. In the former, an early extirpation by surgical means is most desirable. The therapy consists in the application of medicinal agents and the knife. Iodine chromic acid, iodoform alone, or combined with tincture rhatany are mentioned. Then, again the cautery, scissors and knife are discussed. In cases where these means are inapplicable the curette followed by cautery is found useful.—*Zeitschr. f. Chir.* bd. xxvi heft. 5-6.

HENRY KOPLIK, (New York).

CHEST AND ABDOMEN.

I. An Analysis of 207 Cases of Mammary Carcinoma. By S. W. GROSS, M. D. (Philadelphia).—The author has seen 251 neoplasms of the breast, of which 82.47 % were carcinomatous, about the usual proportion. With regard to the period of development,

6 first appeared between 20 and 29 years of age.

39	"	"	"	30	"	39	"	"
78	"	"	"	40	"	49	"	"
62	"	"	"	50	"	59	"	"
21	"	"	"	60	"	69	"	"
1	"	"	"	70	"	79	"	"

Of 154 of the cases, 86.36 % had borne children, and rather more than 90 % of these had nursed their children. The patient's general health was excellent in 69.56 %, indifferent in 17.39 %, and bad in only 13.04 %.

The disease was ascribable to traumatism in 9.66 %, but the tumor developed within six months in less than half of these. Of the 133 parous women, 11 had suffered from puerperal mastitis, but only in 2 was it clear that the tumor started from the induration left by the inflammation. In 2.41 % there was antecedent non-puerperal mastitis, and in four-fifths of these the disease developed at the site of inflammation. In 2.41 % the nipples had been the seat of crusts and scabs for several years before the appearance of the tumor. In 2.9 % it began as Paget's disease of the nipples, or as malignant papillary dermatitis. In 4.83 % it was inherited in direct line of descent. But little light is thus thrown upon the origin of the disease.

The seat of election was the upper and outer portions of the gland and the immediate vicinity of the areola and nipple. In 80 % of the cases pain of a sharp intermittent character was experienced; in about 15 % there was merely a sense of discomfort, while in about 5 % there was no suffering whatever. The skin was involved in 74.87 %, being met as early as two weeks and as late as 29 months, averaging 12.6 months. The opposite breast was infected in 3.86 %, appearing on the average at 21.5 months. Infection of the axillary lymphatic glands was detected in 65.70 %: the supraclavicular in 7.20 %, the

subclavicular in 1.40 %, and the cervical 1 %. This percentage is susceptible of increase, however, since in latter operations, where the axilla has been invariably cleaned out, these glands were affected in 95.35 %.

Of the first 100 cases, 91.75 were marked by local reproduction and he was unable to find a single recovery; in these cases there was no thought of clearing out the new growing glands. In the second series, 107 cases, he speaks with certainty of 53 cases, of which 10 died without operation. Local reproduction occurred in 52.77 % of the operations on the average in 7 months. The average life of the thirteen who died with recurrence was 25 months, varying from two to sixty months. The average life of the five who perished from other affections without recurrence was 32 months, varying from two to ninety-four months. The average period since the operation upon those who still survived without recurrence was three years and three months, varying from eight years and three months to six months.—*Med. News*, Nov. 26, 1887.

JAMES E. PILCHER (U. S. Army).

II. Excision of a Large Part of the Sternum for Retro-Sternal Abscess. By Dr. O. A. RUSTIZKY (Kieff, Russia).—J. J., æt. 23, house painter, entered the city hospital Dec. 23, 1886. He said that a fortnight ago his left lower molar tooth began to ache, causing a swelling in the lower jaw, which has rapidly spread down to the sternum. On the neck, on the upper edge of the thyroid cartilage, there were three openings, emitting ichorous fluid. On introducing his finger into one of the openings the doctor could feel the denuded lower jaw, and also the throbbing vessels. By percussion and shaking the retro-sternal abscess was diagnosed. On Dec. 24, an incision, two inches long, was made above the sternum, from which (the patient being placed head down) a large amount of fetid ichorous fluid flowed out. Elastic catheter being introduced into the opening passed down four and one-half inches. The cavity was daily washed out with solution of salicylic acid. In the middle of January, 1887, the patient began to complain of severe pain behind the sternum, and he suffered from chills and fever. The sternal ends of the clavicle and the second

and the third ribs were swollen, and the skin covering those parts was inflamed. Dr. R. found it necessary to excise the sternum. The operation was made on Feb. 3, 1887. Having made an incision down to the fifth rib, Dr. R. separated the periosteum. The bone was found saturated with pus, and an opening was made into the thoracic cavity without any efforts. The manubrium was excised, leaving its periosteum in front and behind, and the same was done with the upper half of the gladiolus. During this operation there was no occasion to ligate any vessel. The cavity on being thoroughly washed with a solution of salycilic acid, was dressed in a usual manner. Wine, iron and nourishing food were prescribed. The wound speedily was covered with healthy granulations, and a hard cicatrix was formed. The clavicles and the ribs of both sides nearly touched each other. The patient gained in flesh, and had no palpitation and no dyspnœa. Besides this principal operation, a part of lower jaw was excised. The patient is now doing very well.—*Chirurgichesky Vestnik*, St. Petersburg, July and August, 1887.

P. J. POPOFF (Brooklyn).

III. On the Surgical Treatment of Pulmonary Cavities.

By R. J. GODLEE, F.R.C.S. (London).—Pulmonary cavities may be classified thus: (1) Tubercular, (2) due to gangrene, (3) due to bursting of abscess into the lung, (4) bronchiectases. Pliny records a case where a soldier was cured by the opening of his empyema by a spear wound received in battle. Dr. Shingleton Smith has treated pulmonary cavities by the injection of iodoform dissolved in ether; the remedy fails because it is too strictly local in its action. Dr. K. Cérenville, of Lausanne, has resected portions of the second and third ribs, but with doubtful benefit. When a cavity in the lung itself has to be opened it is very important to ascertain the presence of sufficiently firm pleural adhesions at the site of operation. If absent these may be artificially established by passing silk threads through the pleura into the lung. To attempt to stitch the lung to the chest wall is difficult and hazardous. Most cases of gangrenous abscesses in which surgical interference may be useful are the result of acute pneumonia, and are situated near the base of the lung. The exploring trocar

should be used before the knife, and perforation of bronchi must be avoided so far as is possible on account of the consequent hæmoptysis. Several punctures may be necessary before the abscess is struck. The amount of the expectoration is no guide to the size of the cavity. A cavity holding an ounce may give rise to a pint of expectoration in the 24 hours, owing to the irritation caused by the discharge as it travels along the tubes towards the trachea. The opening of a bronchus as opposed to a cavity in the lung tissue or in empyema may be known by the peculiar whiffing noise to which respiration gives rise in the former case. There need be no hesitation in operating in the front of the chest if the cavity to be opened appears to be there. The cavity should be explored by the finger, and the drainage tube must be a long one. The downward slope of the main branches of the right upper lobe may account for its immunity from gangrene by preventing the accumulation of septic matters in it. The middle lobe of the right lung is homologous with the upper lobe of the left, the branches of the upper lobe being eparterial, *i. e.*, above the pulmonary artery. The arteries lie behind, the veins in front of the bronchi. Operation for bronchiectasis is not hopeful when the condition is due to a foreign body. Pulmonary abscess is especially liable to be followed by cerebral abscess. Where there is good reason to suspect the presence of a foreign body, inversion should be thoroughly tried, and that failing, tracheotomy and searching the tubes with curved wire or fine forceps. A case is cited showing that much bronchiectasis may exist in a lung with but little physical sign. If an anæsthetic must be used, chloroform is safer than ether, but both are specially dangerous, and should not be given so deeply as to prevent coughing in case the operation causes hæmorrhage into a bronchus.

Summary : (1) Gangrenous cavities should always be sought, and if possible opened. (2) So should abscesses due to pus from other parts bursting into the lung. (3) Abscesses due to foreign bodies must be opened, and if large, these bodies will probably lie near the middle line. Early tracheotomy and incision is best for foreign bodies (4) Bronchiectases when single will be cured by operation, but when multiple, surgery can do little for them though the main one may be

opened if the pleura is adherent. (5) Tubercular cavities should be opened only when the cough is harassing and the cavity single.

Injections may relieve symptoms but cannot cure.—*Lancet*, March and April, 1887.

A. F. STREET (Westgate.)

IV. Four Cases of Estlander's Operation or Thoracoplasty.—By A. PEARCE GOULD, F.R.C.S. (London).—Narrates four cases in which this operation was performed. He insists that the operation should only be undertaken when ordinary treatment has failed, viz., carefully devised drainage, and the patient in danger of dying of lardaceous disease, tuberculosis, abscess of brain, etc. Further, that the operation must be carefully planned in each case by thoroughly investigating the position and character of the cavity it is intended to close. He prefers a single vertical incision to that of raising a flap as recommended by Mr. Godlee. He insists "upon the necessity of carefully removing *all* the bone in the outer wall of the empyemic cavity, so that only a soft and easily collapsing wall of soft tissue is left." The dense tissue left should be carefully dealt with, as any vessels cut in it may bleed freely and are often difficult to seize. He adds that as cases of empyemata are more early recognized and efficiently treated, cases requiring Estländer will decrease. And in this we agree with him. The records at Brompton show a good many cases of old empyemata not diagnosed or improperly treated.—*Lancet*, Feb. 11, 1888.

H. H. TAYLOR (London).

V. Inguinal Colotomy. By H. W. ALLINGHAM, Junr. F.R.C.S. (London). The author feels more and more confident that in the majority of cases it is a better operation than lumbar colotomy. He discusses inguinal colotomy as performed by Luke, Reeves, Studsgard, Madelung and Verneuil. His own incision is two inches in length, about one inch inside the anterior superior spine of the ilium and parallel with Poupart's ligament. The abdominal muscles are divided and bleeding stopped. A small incision is then made into the peritoneum, the edges being held up by an assistant. Scissors are

used to cut through the peritoneum to the size of the wound. A flat sponge is introduced to keep the intestines out of the way and to catch any blood. The parietal peritoneum is carefully sewed with interrupted fine carbolized silk to the skin all round. The sponge is removed and, should the large intestine not bulge into the wound, search is made for it towards the sacrum feeling for the rectum which is traced upwards or, this failing, the search is continued towards the kidney, and the descending colon felt for and traced downwards. The author at this point differentiates the large from the small intestine according to the sense of touch. The gut being found, that portion with the largest amount of mesentery is selected—generally that which is first pulled up, and is pulled out of the wound. A carbolized silk ligature is then passed through the abdominal wall at the lower part of the wound, then through the parietal peritoneum, then through the mesentery close to the intestine and is returned through the mesentery, parietal peritoneum and abdominal wall on the same side. Another ligature is used in the same manner on the opposite side. Each ligature is then drawn tight and tied separately on its own side. Should the meso-colon be short, the needle is passed through the muscular and serous coats of the gut at its posterior part. The loose piece of the intestine is then stitched all round the edge of the skin, the needle being passed only through the muscular and serous coats. Antiseptic dressings are applied, and pads are placed over the wound to prevent the gut breaking away. In two or three days the gut is opened, with scissors, from above downwards and the edges trimmed to the original incision. Should bad symptoms supervene—such as vomiting, great distention or colic the intestine would be opened within twelve hours. The two orifices that are found on opening the intestine, *viz.*, an upper or larger, and a smaller or lower are accounted for both in size and position by the fact that the sutures which were passed through the mesentery transfixed the skin at the lower part of the wound. The division between the two openings is the so-called “spur.” It is accentuated by fastening the gut well outside the wound. The points claimed by the author in the operation are: (1). The position of the primary incision. (2). The formation of a good spur, failing which

he considers the operation is practically a failure. Cases are then quoted, showing the perfecting of the formation of a "spur." The author then gives his reasons why he thinks inguinal colotomy is preferable to lumbar colotomy. (1). The position of the patient at the time of the operation is better for the patient, the operator and the anæsthetist. (2). There is not so much tendency for the gut to fall away from the wound, neither at the time nor after the operation. (3). The intestine is easier to find, especially so on account of the incision being much higher than usual. The result of five hundred post-mortem examinations is quoted to verify this statement. The anatomical land-marks that can be felt through the incision are: upwards, the last two ribs, the crest of the ilium, the lower part of the kidney. Downwards towards the true pelvis: the first part of the rectum. Towards the middle line: the last three lumbar vertebræ and the aorta. (4). The fæces do not pass below the artificial opening if a good spur be made. In answer to a general statement that the opening in the gut is not high enough from the disease, the author has made the following experiment over and over again on the subject: inguinal colotomy has been performed, the gut being opened at the highest possible point before being stitched to the opening. Left lumbar colotomy has then been performed and the gut fixed to the loin. When the abdomen was opened he found in the majority of cases that there were only four inches of intestine between the two points. According to the post-mortem records of St. George's Hospital between 1848 and 1887 the rectum was the part attacked with malignant disease and not the sigmoid flexure. (5). There is less constitutional disturbance. (6). There is little or no suppuration. (7). The tendency for the opening to contract is not greater. The author thinks that statistics of this operation may be much improved if all the details are carefully attended to and opines that other parts of the intestinal tract will be less frequently opened by mistake. Inguinal colotomy, however, he believes, will not entirely supersede lumbar colotomy, especially in cases where operative proceedings have been delayed too long and the abdomen tremendously distended.

Finally, he has come to these conclusions after having made many

experiments and after having given the subject most careful study and thought.

W. T. WHITMORE (London).

VI. Subperitoneal Pelvic Abscesses and Laparotomy.

By M. TERRILLON (Paris). Abscesses of the pelvis having their origin in the genital organs of the female form two groups, from the point of view of surgical interference. In the one are ranged those which, arising in the neighborhood of the uterus, spread under the peritoneum, raising it up and reaching beneath the abdominal wall, generally above the pubes and at the side of the iliac fossa. These abscesses can then be opened without danger and without touching the peritoneum. Sometimes, even when they do not come in contact with the wall of the abdomen, one can, as Hegar has shown, detach the peritoneum by a surgical operation, and attack them without opening that membrane. A few point at the side of the vagina and can be opened at that spot. In the other variety—more rare and more serious—the abscess is developed at the side of the uterus, and projects into the cavity of the pelvis. It is partly free in this cavity, like an ovarian tumor, but joined by one side to the posterior aspect of the broad ligament and to the border of the uterus. It ordinarily opens in the rectum or sometimes in the bladder. It empties itself badly and becomes chronic and fistulous. Sometimes it ruptures into the peritoneum. In these cases we can reach the abscess, neither by the vagina—for that is dangerous—nor by the rectum—for fear of provoking serious troubles. Lawson Tait has proposed to operate upon them by laparotomy. After opening the peritoneum the purulent sac is united to the abdominal wall, opened and cleaned out. It is then freely drained, washed out every day and is cured in a few weeks. M. Terrillon has recently performed the operation in three cases, two of them with success, and the third would have been certainly successful, if he had been able to interfere before rupture of the abscess had taken place into the peritoneal cavity.—*Bull. Méd.*, June 5, 1887.

P. S. ABRAHAM (London).

VII. Salpingitis and Laparotomy. By M. CORNIL (Paris).

The author had operated upon four cases. The symptoms he found were those which used to be ascribed to peri-uterine hæmatocele. There were severe pains in the lower abdomen, most intense where the ovaries are situated, always worse during any movement, when pressed upon or at the menstrual period. There was profuse menorrhagia which no means seemed able to arrest. The patients also suffered constantly from nausea and constipation. All these symptoms extended over several months—even years, causing life to be a misery. The physical signs were very clear and showed a lesion of the uterine appendages. Per vaginam: a hard, painful swelling was found about the head of one of the lateral cul-de-sacs, leaving the vaginal walls free and movable. Bimanually, the tumor could be very clearly made out, especially when chloroform was administered. It could be felt to be inside the uterine appendages, either on a level with Douglas's pouch, or higher up, behind the pubic arch or by the obturator foramen. The uterus is hardly ever found in its proper place and is constantly enlarged, sensitive and slightly fixed. A rectal examination only confirms these signs. In all four cases the operation was a difficult and a delicate one. The peritoneum was opened in the middle line sufficiently to admit at least 3 fingers. The intestines were kept out of the way by pressure with a sponge. The thumb and the two first fingers were introduced into the pelvic cavity first on one side of the uterus and then on the other. A tumor was thus easily made out and it was found to be irregular in shape, fluctuating or hard, and placed in a variable position by the uterus. The fingers could also detect if it had any adhesions to the intestines. These were generally very slight, but the base of the tumor was always found fixed to the bottom of the pelvis, on the posterior surface of the broad ligament. With a little gentle pressure the fingers can easily separate the tumor all round from the pelvic walls and the intestines, and when thus isolated, the pedicle can be made out which fixes it to the uterus. This pedicle is nothing more nor less than the origin of the Fallopian tube and the ligament of the ovary. The tumor is easily removed from the abdomen and two ligatures suffice for the pedicle.

During this part of the operation the tube sometimes bursts and

allows the escape of the blood or pus it contains. It cannot then be removed en masse, but every particle must be carefully detached and the cavity of the pelvis must be thoroughly cleansed. A good sponging may be sufficient, but it is better to pour into the cavity a stream of tepid water which has been filtered and boiled. This separates all the clots and washes them out of all the corners.

The wound is sutured as for an ordinary laparotomy, and the operation is over. The tube which has been removed is found to be hypertrophied, twisted, and closed at its further end. Generally, the fimbriæ have disappeared and are replaced by a cicatrix. The tube is generally dilated to the size of the thumb, but may attain that of a hen's egg. It is filled with serous fluid, blood, or pus. The lower part of the tube is always closely adherent to the ovary and partly surrounds it. There are generally some bands of fibres uniting it to the other organs as well. The ovary becomes covered with false membranes of variable thickness. Its tissue may be atrophied, normal or even hypertrophied. Sometimes it has been found to contain an abscess or a pouch full of blood.—*Le Bull. Med.*, July 27, 1887.

LEONARD MARK (London).

BONES, JOINTS, ORTHOPÆDIC.

I. On Extensive Resection of the Cranial Bones and their Capacity for Regeneration. By Dr. W. GOEZ (Tuebingen). The author records a case of extensive resection of the cranial bones in a patient, a girl, æt. 17 years, of weakly build. The indication was perforating syphilitic necrosis of three years' duration. The defect caused by the operation of resection involved both parietal bones and both temporal bones. The right parietal and half of the right temporal bone were completely removed. The defect extended beyond the mid line of the vertex to the extent of 2.5 cm. and involved also 4 cm. of the left temporal region beyond the median line of the vertex. The whole defect measured 17 cm. in a sagittal and 14 cm. in a frontal direction. Fistulæ were present in the vertex and temporal regions. There was a very profuse and offensive purulent discharge and constitutional symptoms. There were perforating ulcer of the cornea of the

right eye preceded by iritis, hypopyon, etc. The above symptoms indicated resection, though no separation of sequestra was present. In the cranial bones the separation of sequestra extends over a longer period of time than in other parts of the body. (Küsters case, syphilis, female, æt. 41, separation of sequestrum of temporal bone, three years; Bottini temporal bone, five years). The causes of this delayed separation of sequestra may be an extension of the disease or the reactive inflammation on the part of the healthy bone may not be very marked. A delay in operative interference may compromise the cranial contents. Suppuration of the meninges or compression, or septicæmia from retention, may result. This resection was performed with saw and chisel in the usual manner. The bony parts removed showed the effects of gummos periostitis and osteomyelitic processes. The extent of the resection of necrotic bones is not an element of danger. The dura in such cases is generally well protected by the surrounding granulations. Regeneration of defects in cranial bones varies as to whether the defect has been of traumatic or pathological origin. In the former case, as in trephining, the bony tissue is but imperfectly replaced, whereas in necrotic processes the regeneration, as in von Brun's case, may be complete. The reason may exist in certain anatomical facts. Regeneration of the cranial bones takes place from the pericranium and dura mater both not abundantly supplied with blood-vessels. The tissue of the diploe also aids in the formation of callus, and some authors (Kosmowski) would make it the only source of regeneration. Hyperostoses and osteophytes would argue the capability on side of the pericranium and dura to produce bone. As to regeneration of bony defects from syphilitic necrosis or tubercular processes Küster records a case of complete regeneration of a defect 8x10 cm. In the author's case of v. Brun's the large space left by operation was replaced five-sixths of its extent by bone three years after resection. The above proves that regeneration in the cranial bone is by no means as imperfect as is the generally accepted fact. In pathological processes this capacity for regeneration is not by any means second to that seen in traumatic lesions.—*Beitrag zur klin. Chir. von Dr. Paul Bruns, Tübingen, 1887.*

HENRY KOPLIK (New York).

II. Case of Reproduction of a Portion of the Cranium without the Co-operation of the Pericranium. By JAMES STRATTON CARPENTER, M.D. (Pottsville, Pa.). This case is submitted in corroboration of the views of Macewen announced in the *ANNALS OF SURGERY*, vol. vi, pp. 289 and 389. A boy, æt. 11, suffered a compound, comminuted depressed fracture of the cranium at the right parietal eminence. After removing the fragments, it was found that quite an extensive laceration of the pericranium had occurred, leaving a gap of about a square inch; the entire thickness of the bone, including the diploe, had been removed at the point of fracture and necrosis was expected from this severing of the blood supply. However, the lost substance was entirely reproduced and a complete cure resulted. —*Med. News*, Dec. 17, 1887.

JAMES E. PILCHER (U. S. Army).

III. Experimental Studies on the Origin of Tubercular Areas in Bones. By Dr. W. MILLER (Göttingen). That tuberculous emboli are the starting points for tuberculous areas in bones has not yet been demonstrated. It is difficult to trace the origin of certain cheesy or granulation areas in bones, but these latter are most commonly met with and frequently affect the articular extremities in a symmetrical manner, suggesting the division of an embolus at the dividing point of an artery. Those areas in bones which have the shape more or less of an infarction deserve especial attention. König first raised the question as to their origin. He traces a probable connection between them and emboli of tubercular nature.

These infarction forms are mentioned by v. Volkmann. The hemorrhagic infarction, however, is of doubtful existence in the bones. Among two hundred museum bone preparations in Goettingen, one-fifth showed these wedge-shaped (infarction shaped) areas. With the exception of the cranial bones and bones of the face and ribs, these peculiar tuberculous areas are met in all the bones of the skeleton. The base of the wedge is directed toward the joint. It is typically illustrated in the vertebræ and bones of the tarsus. The fact that the bloodvessels in such infarction form areas of tubercular nature are generally obliterated by tuberculous processes makes a direct examina-

tion of these foci of but little value. Twenty areas were examined by the author with negative results. These investigations are only rendered more difficult by the fact that in bones the anatomical history of the nutrient vessels is still incomplete. In the above paper the author gives details of experiments on rabbits, dogs, sheep and goats undertaken with the object of obtaining some light on the mode of origin of these wedge-shaped tubercular areas in bones. He used with the usual precautions diluted tuberculous pus or sputum. The animal most convenient was found to be the young goat. The injections of tubercular matter were made into the nutrient artery of the bones. As a result, the author found that it is possible to cause by experimentation the same forms of tuberculosis in bones of animals as are clinically observed by the surgeon. The forms of experimental tuberculosis observed were circumscribed areas, diffuse tuberculous osteitis and miliary tuberculosis of the bones. In many cases the local phenomena (bones) were absent and general symptoms predominated. The local symptoms were developed in a subacute or chronic manner. In most cases the bone affection lasted over six weeks and the animals were in good condition when killed.

The disease produced was a local tuberculosis. The circumscribed forms of the disease occurred mostly in the heads of the bones. The diffuse forms affected the medulla and the cortex of the shaft. Perforation of the tuberculous areas into the joint was observed three times. Of especial interest were cases where loose sequestra projected into the affected joint. Also those cases of wedge-shaped (infarction) areas. The microscope confirmed the gross appearances. Granulation tissue with typical tubercle in old areas and tubercle bacilli were less abundant than in recent areas of infection. The small areas of disease as also the larger ones in the medulla were separated from the healthy tissue by a zone of demarcation composed of young or fibrilla connective tissue.

By killing the animals at an early period the development of areas of tubercle could be studied. These areas directly follow in time the injection of the infectious material, and are caused by the retention of tuberculous particles in the circulatory structure of the bone. The

disease always (with two exceptions) appeared in the bone injected. Tubercles in the lung and other organs were a part of the phenomena observed. The lymph glands also of the popliteal space were found to be infected. Though in most of the cases the injected poison reached the general circulation, it was distinctly found that the injected matter formed emboli in the arteria nutritia or its branches. Intravascular changes then began to appear, a diffuse tubercular endarteritis for the most part necrosis of the wall of the artery and infection of the neighboring tissue. As to the diffuse forms of ostitis and osteomyelitis they also result from an embolism of the nutrient artery or its branches with the eruption of numerous small and large areas of tubercular foci; the confluence of these in the cortex of the shaft and medullary zone gives the above clinical and pathological changes.—*Deutsch. Zeitsch. f. Chir.*, bd. 25, hft. 1 and 2.

HENRY KOPLIK (New York).

IV. Fracture of the Spine. By HERBERT L. BURRELL, M.D. (Boston) and ISAAC W. CHISHOLM, M.D. (New Concord, O.). In the light shed by five cases occurring at the Boston City Hospital, Dr. Burrell concludes: (1). That in the *immediate* correction of the deformity and fixation with plaster-of-Paris jacket or other means we have a rational method of treating a large number of cases of fracture of the spine. (2). That, considering the hopelessness of results in fracture of the spine when treated expectantly, almost any risk is justifiable. (3). That the immediate correction of the deformity is imperative, *if* softening of the cord can and does occur from pressure at the end of forty-eight hours. (4). That the suspension of the patient is only a means of rectifying the deformity, and that certain fractures can be simply pressed into position while the patient lies prone or supine.

In this connection may be considered Chisholm's case of a boy, æt. 10, who suffered a dislocation of the third lumbar vertebra, probably accompanied with fracture. Under the expectant local treatment and general tonic treatment he has improved, and, nine years later, is able to act as clerk in a store.—*Boston Med. and Surg. Jour.*, Aug. 25, 1887, and *N. Y. Med. Rec.*, Dec. 24, 1887.

JAMES E. PILCHER (U.S.Army).

V. Bony Ankylosis of the Temporo-Maxillary Joint and its Treatment. By G. ZIPFEL (Paris). The treatment of ankylosis of the lower jaw by the production of a false joint at the level of the temporo-maxillary articulation no longer deserves to be called, as it was by Sarrazin, a piece of rashness only to be undertaken by great surgeons. The subject has not received much notice in France, and it is to English, German and Italian authors that M. Zipfel has had to resort for some of the best information he expounds in his thesis. There are many causes for ankylosis of the jaw: Arthritis with a traumatic, rheumatic, tuberculous origin, otitis media, infectious diseases, osteo-myelitis, and lastly, irreducible dislocations. The prognosis is serious on account of the disturbance caused to nutrition, the production of sound, and respiration; then there is one formidable complication, vomiting, which, from the mouth being shut, may bring about immediate asphyxia.

There are two methods of operating: Osteotomy and resection. Osteotomy can be done in four different ways: (1). It may be linear, through the neck of the condyle. (2). Cuneiform, involving the neck of the condyle. (3). Linear, through the coronoid process. (4). Linear, through the neck of the condyle and the coronoid process together. The careful study of five cases of osteotomy and 21 cases of resection, which are given at length in the work, show that resection is the only operation which gives satisfactory and permanent results. Its performance is, however, difficult and the following is the plan proposed by the author:

1. An incision to be made four centimetres long, starting from the supra-glenoid root of the zygomatic arch, running downwards and slightly forwards and not extending deeper than the subcutaneous cellular tissue for fear of wounding the temporo-facial nerve, which the author finds, crosses over just an inch below the arch; if the coronoid process has to be dealt with an extra incision of 3 centimetres has to be made running in the direction of the zygoma and therefore harmless

2. Recognize and push aside the lobules of the parotid gland, keep the nerve trunk out of the way by means of a blunt hook; the condyle and its neck can then be easily got at.

3. The periosteum has to be scraped off the bone, care being taken not to wound the maxillary artery.

4. A curved sound with a groove is passed in, and along it is slid a chain saw. In operating, the buccal cavity does not communicate with the external wound, the consequence is the treatment can be an anti-septic one.

In those cases to which this operation does not seem suitable, an attempt might be made to force open the mouth by rupturing the bone in the neighborhood of the ankylosis. The author describes an osteoclast which has been made for this operation.—*Gazette Médicale de Paris*, July 2, 1887.

LEONARD MARK (London.)

GYNÆCOLOGICAL.

I. Laparo-Elytrotomy. By W. DUNCAN MCKIM, M.D. (New York). The author considers that where the obstruction to delivery lies below the cervix uteri, laparo-elytrotomy should be preferred to Cæsarean section, for it is simpler, requiring usually less time and skill for its performance; it can be done with less hope of success in a later stage of exhaustion; it would seem on *a priori* grounds less dangerous for mother and child, and, when the statistics are fairly weighed, it has as small if not a smaller mortality. He reports a new case, the fourteenth, in which a dead eight-pound fœtus was removed from a girl, æt. 16, who had been in labor for twenty-nine hours. The dystocia was due to the smallness of the pelvis, the conjugate diameter being but three inches. The patient made a recovery delayed by her generally feeble condition.—*N. Y. Med. Jour.*, Dec. 10, 1887.

JAMES E. PILCHER (U. S. Army).

II. Painful Cystitis in the Female. By M. TERRILLON (Paris). A tall, strong country woman became affected with cystitis some months after her marriage, and when this had lasted a year she was treated, but without relief, by injections of nitrate of silver, by forcible dilatation of the neck of the bladder and by injections of a strong solution of cocaine.

An artificial vesico-vaginal fistula was then made with the object of giving the bladder rest by preventing any accumulation of urine in it, and immediate relief was the result. M. Terrillon insists that if intravesical injections be used in these cases they must be small in bulk or they will aggravate the evil by exciting contractions. Injections of opium, henbane or belladonna fail because of the insignificant absorptive power of the mucous membrane of the bladder. M. Guyon has shown that every case of vesical irritation not due either to stone or tumor is relieved by nitrate of silver injected by means of a syringe and a hollow sound, and in strength varying from 1 in 100 to 1 in 50. Some surgeons advise that where recourse is had to vaginal cystotomy an elliptical piece of the septum should be excised or the mucous membrane of the bladder stitched to that of the vagina. The opening once made must be maintained or the operation will fail for the same reason as forcible dilatation of the neck of the bladder fails, namely, because it does not keep the bladder at rest for a sufficiently long period. Hence, a drainage must be retained in the opening which may be made by means of the knife or the thermo-cautery. The former is apt to cause primary and the latter secondary hemorrhage. Sometimes the drainage tube is ill tolerated. The opening must be kept patent for some months, a portable urinal must be worn and the vagina must be kept free from incrustations of the salts of the urine. Sometimes the fistula heals itself, sometimes it has to be closed by the ordinary operation. The bladder will then often be found small owing to contraction, and the resulting tenesmus may require treatment by nitrate of silver. The operation fails of complete success where the cystitis is due to tubercle, but by relieving pain it renders life supportable. In the male the treatment is by perineal cystotomy. —*Le Bulletin Médical*, July 13.

A. F. STREET (Westgate).

III. Vesical Calculus in Woman. M. Pozzi (Paris). A report was read to the Société de Chirurgie of a case of vesical calculus in the female, which was extracted after dilatation of the urethra. The patient being under chloroform, M. Pozzi dilated the urethra by means of six hard gum elastic bougies. This took about ten minutes

and allowed a calculus to be extracted which was 38mm. in diameter ($1\frac{1}{2}$ inch). Having ascertained with his finger that no other calculus was present and that the walls of the bladder were healthy, the operation was terminated with an antiseptic douche.

The calculus here exceeded the limits of 3 centimetres ($1\frac{3}{16}$ inch) which until now have been allowed for extraction in this manner. Although the operation is a rapid one and only lasts about 10 or 15 minutes, chloroform is absolutely necessary as besides doing away with the pain it paralyzes all the muscular fibres about the part, and allows them to regain activity afterwards.

The exploration afterward with the finger brings to light any calculus which the sound has not detected. This dilatation might therefore be used for diagnostic purpose, whenever there is any doubt about the number, shape, nature and situation of the calculi. The only precautions necessary are the antiseptic douching afterward and the retention of two tubes in the urethra for a few days to facilitate the irrigation.—*Le Bulletin Medical*, July 31, 1887,

LEONARD MARK (London).

IV. On Peri-Uterine Inflammation with Deposit of Doubtful Nature Whether Purulent, Serous or Hæmorrhagic. By DR. EDM. BLANC (Lyon). The author recommends for all deposits accompanied with inflammation around the uterus the use of the aspirating trocar. He advises that it should be employed per vaginam. If liquid exudes, a knife is introduced through the cannula, and a sufficient opening made to assure a free exit of the liquid. An iodoform sponge is introduced. Afterward antiseptic syringing daily. It is indispensable for cure to prevent too rapid closing of the wound. Recovery usually occurs in 3 or 4 weeks. These swellings seldom fluctuate, but on the contrary present great hardness "like wood or fibro-cartilage." A favorable sign is tenderness on pressure. Dr. Blanc insists on the natural incurability of the masses, and on the danger of their opening into the peritoneum or neighboring organs.—*Thèse de Lyon*, 1887.

H. DES VOEUX (LONDON).

REVIEWS OF BOOKS.

THE RULES OF ASEPTIC AND ANTISEPTIC SURGERY. A practical Treatise for the Use of Students and the General Practitioner. By ARPAD G. GERSTER, M. D., Professor of Surgery at the New York Polyclinic ; Visiting Surgeon to the Mount Sinai and German Hospitals ; pp. 332. With 248 photo-engravings and two chromo-lithographic plates. New York : D. Appleton & Co., 1888.

The well known author of this book has prepared a manual of aseptic and antiseptic *technique* which reflects upon himself the greatest credit, and which will do much to hasten the universal acceptance of the newer methods among those who do not adopt them on account either of ignorance or inability to comprehend them.

It is not a complete manual of operative surgery, and is not intended to supplant any of the well known works on this subject. It is, however, a complete exposition of so much of the theory and the principles of asepsis and antiseptis as is required for their proper observance, and a complete description of all details by which success in such work is to be achieved. His thesis is that dictum now generally accepted that the *surgeon's acts determine the fate of a fresh wound, and that its infection and suppuration are due to his technical faults of omission and commission.*

As Cheyne has well shown modern wound treatment is based entirely on long accepted and well known principles of preservation of organic material, and these principles always must underlie the practice ; the particular methods may change from time to time, as they have notably changed since Lister first showed us his early forms of dressings, but the *facts never*. For irrigation the author uses, of course, the mercuric chloride solution : for the instruments he advises carbolic acid. For the peritoneal cavity he recommends the boro-salicylic solution. For dry dressings he employs iodoform alone or with bismuth subnitrate. We do not find mention either of hydronaphthol, zinc oxide or naphthaline, all of which we have found both cheap and as reliable as the others. The differences between aseptic and antiseptic work find frequent illustration throughout the book. Neuber's bone

drainage tubes have been discarded by the author, who finds nothing so suitable as black rubber; but he still practices Neuber's method of canalization without other drainage. Schede's healing by means of a moist clot he both describes and recommends, though he does not give it a place of the greatest importance.

Chapter v, he devotes to special applications of the aseptic method. This constitutes a pretty full discussion of regional surgery, less time being devoted to the instrumental technique than to the enforcement of aseptic practices, though the pages bristle with practical hints of great value. Of the features covered by this chapter we will stop only to notice what is said about radical cure of hernia, in which our author's experience though not extensive has been very satisfactory. He follows, in the main, Czerny, whose method has always seemed to us the best, though we have for some time now substituted two or three silver sutures for his shoe lace catgut suture of the external ring, with better satisfaction. We do not observe that he advises the application of the same method to the radical cure of large or small umbilical herniæ, though an experience of several cases has taught us its advantages.

For chapter vi, which deals with the natural history of idiopathic suppuration and its treatment we have a warm welcome, since now—perhaps for the first time—the student can find in English that which our text-books have been so slow to teach,—a summary of our present knowledge of the bacterial origin of pus; in other words the parasitic causation of phlegmon. While this portion of the book seems to be rather the result of diligent study of the work of Koch and Rosenbach, than the product of the author's own research, it is none the less welcome since nothing better can be found. A number of Koch's photographs are reproduced and three of Rosenbach's colored plates are introduced by which the text is well elucidated. This part of the chapter is comparatively short; so short that we wish it might have been elaborated, since we consider it one of the greatest value at the present time. The balance of it is given over to the diagnosis and treatment of phlegmon, under which caption is included necrosis, acute and cold abscesses and fistulæ. Here, as throughout the book, the most radical and hence the best methods are advised and illustrated. In not a few places reference to the surgical anatomy of the parts is made, by means of which the better antiseptic attack on their diseases is favored. One statement, which alone is a sufficient refutation of all argument against antiseptic methods, deserves to be quoted and emphasized, that in *ten years* of extensive surgical practice, Dr. Gerster has had but *four cases of erysipelas*.

The third part of the book is devoted to tuberculosis, its aseptic and antiseptic treatment. If the author had seen fit to do as much for the profession at large in discussing the pathology of tuberculosis, as he did in considering that of suppuration, we should have been spared a certain feeling of disappointment; the more so, since we have been led to expect that this would constitute a considerable portion of the work. There is still the same necessity for widely diffusing clear notions on this topic that obtains with reference to the other. When eminent surgeons and authors of treatises, or editors of cyclopædias are still to be numbered among the unbelievers, surely too much cannot be said by such men as Dr. Gerster. Still as he has seen fit to treat the subject rather in its practical relations, we can only express a hope that he will elaborate the chapter in a subsequent edition. Most of this chapter is devoted to the consideration of exsections with suitable dressings for the wounded parts. He gives an excellent description of Wladimiroff-Mickulicz' osteoplastic resection of the tarsus.

Part iv takes up gonorrhea, and its antiseptic treatment, and part v syphilis, aseptic and antiseptic treatment of external lesions.

Their consideration is more *apropos* here than might at first appear: in the former he has a great deal of value to say about the endoscope and treatment of urethral lesions by its aid: the latter is brief, but thoroughly practical.

A feature of the book is the introduction of a large number of illustrative cases, which help to carry conviction as to the value of the methods according to which they are treated, and which make a valuable record of the author's work: nevertheless, it appears to us that some of them might have been omitted without detriment.

But the most conspicuous feature which the work presents is constituted by the illustrations, most of which are photo-reproductions from negatives taken by the author, or under his immediate direction, and are beautiful examples of the photo-engraver's art. Exception can only be taken to a few of them which though attractive, yet, reveal nothing in any instructive detail; such, for instance, are figs. 100, 114, 185, 199, 214. But this is, perhaps, captious criticism, since they are simply superfluous. In the main, however, the illustrations do as much to convey valuable lessons as does the text, and each vies with the other in value.

The paper is, as befits such work, heavy and finely finished, and the typographical and artistic appearance of the book is so excellent that we consider it the finest medical book of its kind ever issued in America. It is one of the greatest value to every one who aspires to do

even a little surgery, since he should aim to do this little well, and author and publisher should each be proud of their respective shares in its production.

ROSWELL PARK.

LEHRBUCH DER ALLGEMEINEN CHIRURGIE NACH DEM HEUTIGEN STANDPUNKTE DER WISSENSCHAFT. Bearbeitet von Prof. Dr. H. FISCHER, (Breslau). Stuttgart, Ferd. Enke, 1887. New York, G. E. Stechert.

TEXTBOOK OF GENERAL SURGERY, ACCORDING TO THE PRESENT STATE OF MEDICAL SCIENCE.

In one large octavo volume of some 900 pages, the author has treated the entire subject of general surgery in such a manner, that the student or practitioner may readily find all that is important, and all that has of late been published in regard to any single question, or chapter in general surgery.

The reader is supposed to possess a fair knowledge of general pathology, but the special surgical pathology is, of course, everywhere given in detail. Where, in treating of any single subject, various conflicting statements present themselves, they have all been admitted and given their due consideration, and where a want of special investigation has made itself felt, this deficiency has been pointed out. For 21 years the author, (as he tells us in the preface), made the contents of this book the subject of special study, and three entire years, he adds, it took him merely to write it out.

From these data some idea of the amount of work contained in the book may be formed, and a glance at the comparatively large amount of matter and historical learning contained in the fine print of the notes readily sustains them.

The extensive use of numerals and letters to mark the divisions and subdivisions of the paragraphs, together with the printing of the headings in interspaced and capital types, gives the book an orderly appearance, and facilitates the finding of any given subject, by reducing the confusion incident to the handling of large amounts of matter.

An extended review of the various chapters cannot here be given; nor is it necessary to do so considering the objective manner in which the matter has been treated. Wherever the author deemed himself called upon to take sides in a question he has done so with the best judgment.

Occasionally the reader is made aware of the difficulties presenting

themselves to the writers of such books, as, for example, the question where to draw the line between the old and newer teachings on the same subject, and, as a consequence, the writer has frequently placed statements among the notes, which others would no doubt have given in the text.

We may, however, remark that the author personally still adheres to the typical Listerian dressing for wounds, with carbolic acid, although other methods, of course, receive due mention.

No attempt is made to distinguish clinically between septic and putrid infection, and the author appears to be inclined to disregard the distinction between *sapræmia* and *septicæmia* insisted upon by such experimenters as Gaffky. Much of the subject of the antiseptic treatment of wounds, etc., has been taken from the author's own previous works on the subject.

The chief feature of the book is its completeness, due to the immense diligence of the author in making himself familiar with the publications (easily accessible in Germany) on every subject. As such it will fill a valuable place in every medical library, and from its objective character and honest workmanship it may unhesitatingly be placed in the hands of students, a thing which cannot be said of most similar books.

The work is sparingly illustrated with wood-cuts, many of which are borrowed (with all due credit) from other publications.

W. W. VAN ARSDALE.

SURGICAL OPERATIONS. PART I. THE LIGATURE OF ARTIERES. A SHORT DESCRIPTION OF THE SURGICAL ANATOMY AND MODES OF TYING THE PRINCIPAL VESSELS. By SIR WILLIAM MAC CORMAC, Surgeon and Lecturer on Surgery, St. Thomas's Hospital. London; Smith Elder & Co. 1885.

The ligature of arteries is not a subject which gives the systematic writer the same opportunities of original treatment which have of late years been furnished by other branches of our art. It is true that recent observations and recent papers have tended to re-open questions which have for years been regarded as absolutely settled *e. g.*, that of whether it is necessary or even desirable to tie a ligature tightly enough to divide the middle and inner coats of a vessel, and that of whether the femoral should be tied in Hunter's canal for popliteal aneurism. At St. Bartholomew's it is reported that a well known and distinguished conservative among surgeons, is now tying in the popliteal space itself for the last mentioned form of aneurism; and it is almost certain that in

his capacity as examiner, he would, a few years ago, have plucked anyone who had at the College of Surgeons advocated so bold a heresy against the teaching of John Hunter.

Nevertheless, the main changes in this field of surgery in our times, have been in the methods of dressing and in the direction of increased readiness to tie large vessels near the origin of their branches; and, as the process of exposing an artery and tying an aseptic animal ligature does not materially differ from that of tying an old fashioned silk one, the technique of such operations remain much the same.

There are however, differences enough to justify the writing of a new account, and it would be difficult to surpass for practical purposes this of Sir Willian Mac Cormac's. I speak from experience. It has been my lot during the past year to tie several arteries which I had never ligatured before in the living subject, and on each occasion I found in his book exactly the preliminary information wanted.

The 138 large octavo pages do not contain an exhaustive inquiry into every historical, philosophical and literary question concerning the subject, but a quite sufficient, clear, and judicious description of each operation, of the anatomy of the parts concerned, of the necessary surface markings and guides, of the usual indications for the operation, and various things to avoid and to guard against.

The illustrations, many of them by the author's colleague at St. Thomas's, Mr. Anderson, are exceptionally good, and some display an artistic feeling not commonly to be found in other than French surgical books. The engraving is clear and the whole get up of the book pleasing and convenient.

C. B. KEETLEY.

DIE OPERATIVE BEHANDLUNG DER HODENTUBERCULOSE DURCH RESECTION DER NEBENHODEN. Von Prof. Dr. BARDENHEUER. (Mittheilungen aus dem Kölner Bürger Hospital, drittes heft. New York: G. E. Stechert..

THE OPERATIVE TREATMENT OF TUBERCULOSIS OF THE TESTIS BY THE RESECTION OF THE EPIDIDYMIS.

The author founds his treatment on the principle that tuberculosis of the testis begins primarily in the epididymis. The tubercular nodules are first found on the head of the epididymis, and from here spread over the rest of the structure of the testis. After the testis, the vas deferens, vesiculæ seminales, prostrate, urethra, and

kidney become affected in the order named. The tuberculous processes attack the vas deferens after the lapse of years. This also after the testis and epididymis have become affected. The ureter once affected, the process is apt to involve the peritoneum and thence a general infection may result. Tuberculosis of the epididymis is rarely found secondary general tuberculosis. It is a primary disease. Tuberculosis may exist in isolated form for years in the epididymis. This is explained by the encapsulation of the tubercle bacilli in the tunica albuginea epididymis. After the invasion of the vicinity of the tubercle nodule (epididymis) general infection ensues. Localized tuberculosis of the epididymis is rarely found with tuberculosis of the lung. In long standing tuberculosis of the epididymis, we can surmise the infection of the testis if not the rest of the genito-urinary tract. The infection spreads in an ascending direction. Tuberculosis of the kidney is often a result of this ascending process, but may be found in general tuberculosis. The treatment proposed by the author is the resection of the epididymis as the earliest moment. The patients readily consent to this early interference. The sexual powers of the patient (in a limited sense) are retained after the operation. This latter advantage of the operation would recommend it to notice. The total resection of the epididymis is advocated and in this the author considers himself first on the field. He has demonstrated the possibility of the operation, though Hueter has doubted its utility. The author is confirmed in the belief that the early total resection of the tuberculous epididymis can prevent the general spread of the disease in a majority of cases. In only one case has he observed a return of the disease with affection of the kidney and ureter after resection.

HENRY KOPLIK.

LEÇONS DE CLINIQUE CHIRURGICALE. Par le DR. ANDRÉ BOURSIÈRE
Paris. 1887.

LECTURES ON CLINICAL SURGERY.

The subjects which are treated in these lectures are most of them amongst the commonest in surgery, but the descriptions and directions for treatment are exact and distinct, though we are not inclined to agree with all the author's views.

The book opens with an excellent description of thyro-hyoid cysts. There are, as we are reminded, somewhat varied views on their path-

ology; they may be bursal glandular or congenital in origin, and good reasons are given for believing that any of these views may be correct, in other words, the author is of the opinion that such cysts vary in their pathology, a view which is borne out by the variability of their contents. The difficulties and dangers are fully considered.

After some remarks on the subject of papilloma of the palate, nasopharyngeal polypus and scirrhus of the breast we came to another lecture of more than usual interest, viz., perforations of the intestine occurring in connection with strangulated hernia. Whilst the various possible modes of dealing with such perforations are fully discussed, there is but little attempt to show which is applicable under various conditions. The varieties of adhesions are elaborately discussed but no mention is made of the mode of treating them by the removal of adherent masses of omentum. Another chapter is devoted to the discussion of retention of urine after operations, and we confess to being somewhat surprised in reference to traumatic retention, as it is called. *Vous consulteriez vainement sur le point les livres classiques de chirurgie; les plus récents sont muets sur la retention d'urine de cause traumatique.* This may be true of French works on surgery, but it does not apply to German, English or American. All through these lectures there is a notable absence of reference to anything foreign. Very few pages are wanting in references, but there are scarcely half a dozen works in German or English referred to, which probably accounts for some of the statements which are current. The remainder of the book contains but little of interest, phimosis, fractures of the patella, and the diagnosis of talipes equinovarus have each a chapter allotted to them. The book is agreeably written, and if regarded in the light of a series of clinical lectures to students contains some excellent material

W. BRUCE CLARKE.

THE NATURE AND SIGNIFICANCE OF PAIN. By CLINTON T. DENT, F. R. C. S., Assistant Surgeon to St. George's Hospital, London; Harrison & Sons. 1887. 8vo. pp. 43.

This was delivered as an introductory address at the annual opening of the medical school, and is an exceptionally good specimen of the class of literature to which it belongs. So severe and exact is the method usually adopted by surgical writers of the modern school, that it is almost a relief to read, once in a while, a well written essay in the good old style.

The following extract deserves to be quoted both for its intrinsic mer-

its, and because it conveys a better idea of how the subject is dealt with than any mere analysis or description could.

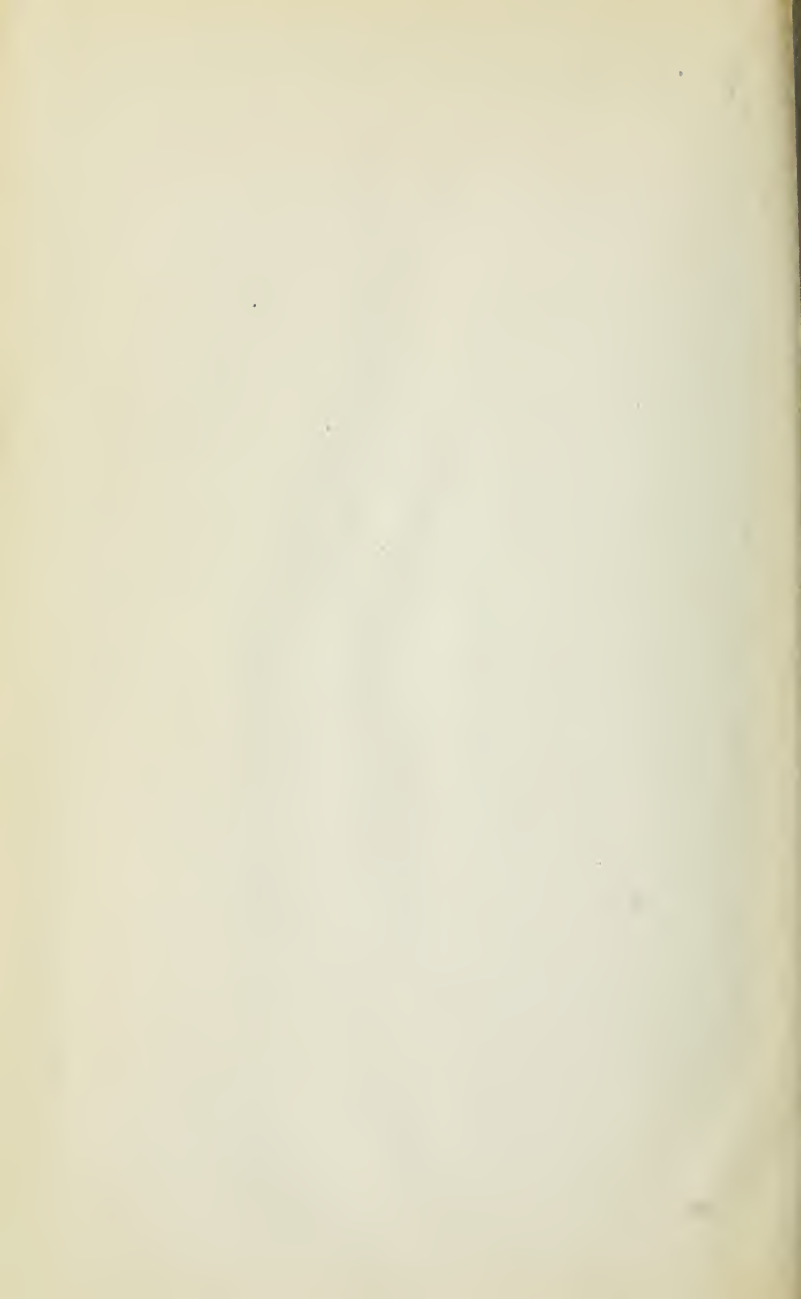
"The art of medicine does not consist in mere germ hunting. We need not in our daily work seek further back for the origin of evil than in poverty, ignorance and vice. Formidable antagonists in truth, but, though vast and terrible, these monsters are not unconquerable. The sum of pain that has to be endured by mankind is huge, and we still grapple with it but inefficiently. Yet, as ignorance and education progress, so must one, if not two of these factors in causing disease and suffering—ignorance and vice—shrink back before it; for ignorance and innocence are blood relations, but ignorance and vice are but associates always banded together for evil. With poverty as a source of pain you will have only too frequent occasion to become familiar—so commonly, in fact, that you may be apt to neglect the factor as a cause." (Then follow illustrations). "Poverty and pain. You hear often the fallacy urged that health cannot be bought. But much immunity from pain and disease may be bought, for rest is the natural antidote to pain. Where would be such cases as I have described, and where the thousand and one deformities met with in our everyday work here, if rest could be provided, not merely prescribed?"

These true and forcible lines might be commended to the attention of the army of wealthy individuals who, in England and probably in other countries think they have done very well indeed when they have annually given to hospital charities less than a tithe of what they have spent on their amusements.

WESTMINSTER HOSPITAL REPORTS, vol. iii, Edited by H. B. DONKIN and C. A. HERBERT. London: J. & A. Churchill, 1888.

The contents of this book are chiefly medical, but there are short papers on the treatment of wounds and on the standard of vision required by government for officers entering the civil or military services, by Mr. Cowell and Mr. Macnamara, respectively. Another paper of surgical interest is that by Dr. Hebb, on "Ulceration of the Vermiform Appendix and its Relation to Fæcal Calculoid." The author believes that, whether they are discovered or not, calculoids or foreign bodies are almost invariably the cause of ulceration of the vermiform appendix.

C. B. KEETLEY.



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